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Bulletin 100
VOLUME 4

# CONTRIBUTIONS TO THE BIOLOGY OF THE PHILIPPINE ARCHIPELAGO AND ADJACENT REGIONS

# FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS

JOSEPH A. CUSHMAN
*Of the Boston Society of Natural History*

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

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The scientific publications of the United States National Museum consist of two series, the *Proceedings* and the *Bulletins*.

The *Proceedings*, the first volume of which was issued in 1878, are intended primarily as a medium for the publication of original, and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals, and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper, in pamphlet form, is distributed to specialists and others interested in the different subjects, as soon as printed. The dates of publication are recorded in the tables of contents of the volumes.

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Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 100, volume 4, of the *Bulletin* series.

WILLIAM DEC. RAVENEL,
*Administrative Assistant to the Secretary,*
*in charge of the United States National Museum.*

WASHINGTON, D. C., June, 1921.

# TABLE OF CONTENTS.

---

Page.
Introduction .......... 21
Systematic part .......... 35
Order Foraminifera .......... 35
Family Astrorhizidae .......... 35
Subfamily Astrorhizinae .......... 35
Genus Astrorhiza .......... 35
angulosa .......... 35
granulosa .......... 35
agglutinata .......... 36
Genus Rhabdammina .......... 36
abyssorum .......... 36
var. radiata .......... 37
irregularis .......... 38
discreta .......... 39
linearis .......... 40
Genus Marsipella .......... 40
gigantea .......... 40
cylindrica .......... 41
Genus Bathysiphon .......... 41
filiformis .......... 41
rufus .......... 42
rufescens .......... 43
flavidus .......... 44
var. giganteus .......... 44
papyraceus .......... 45
Genus Rhizammina .......... 45
indivisa .......... 45
algaeformis .......... 46
Subfamily Saccammininae .......... 46
Genus Psammosphaera .......... 46
fusca .......... 46
parva .......... 47
Genus Iridia .......... 47
diaphana .......... 47
Genus Saccammina .......... 48
sphaerica .......... 48
var. catenulata .......... 48
Genus Proteonina .......... 49
difflugiformis .......... 49
fusiformis .......... 49
testacea .......... 50
Genus Technitella .......... 50
legumen .......... 50
Genus Tholosina .......... 51
bulla .......... 51

Systematic part—Continued.
Family Astrorhizidae—Continued.
Subfamily Saccammininae—Continued.

Page.
Genus Thurammina .......... 52
papyracea .......... 52
papillata, var. castanea .......... 52
Subfamily Hyperammininae .......... 53
Genus Hyperammina .......... 53
elongata .......... 53
friabilis .......... 54
Genus Saccorhiza .......... 54
ramosa .......... 54
Genus Tolypammina .......... 55
vagans .......... 55
Genus Dendrophrya .......... 56
ramosa .......... 56
var. robusta .......... 57
attenuata .......... 57
Genus Haliphysema .......... 58
catenulata .......... 58
Genus Jaculella .......... 59
acuta .......... 59
obtusa .......... 59
Genus Sagenina .......... 60
frondescens .......... 60
divaricans .......... 60
Subfamily Ammodiscinae .......... 61
Genus Ammolagena .......... 61
clavata .......... 61
Genus Ammodiscus .......... 62
incertus .......... 62
var. discoideus .......... 63
exsertus .......... 64
Family Lituolidae .......... 64
Subfamily Aschemonellinae .......... 64
Genus Aschemonella .......... 64
catenata .......... 64
Subfamily Reophacinae .......... 65
Genus Reophax .......... 65
scorpiurus .......... 65
pilulifer .......... 66
distans .......... 66
bacillaris .......... 67
dentaliniformis .......... 68
nodulosus .......... 68
var. hormosinoides .......... 69
guttifer .......... 69
aduncus .......... 70
cylindricus .......... 70
pseudobacillaris .......... 17
findens .......... 71
spiculotestus .......... 72
horridus .......... 73
agglutinatus .......... 73
bilocularis .......... 74

Systematic part—Continued.
Family Lituolidae—Continued.
*Subfamily* Aschemonellinae—Continued.

Page.

- Genus Hormosina.......... 74
  - globulifera.......... 74
  - ovicula.......... 75
  - normanii.......... 75
  - ovaliformis.......... 76
  - elongata.......... 76
  - carpenteri.......... 77
- Genus Haplostiche.......... 78
  - dubia.......... 78
- Subfamily Trochammininae.......... 79
- Genus Trochamminoides.......... 79
  - proteus.......... 79
- Genus Haplophragmoides.......... 79
  - canariensis.......... 79
  - emaciatum.......... 80
  - scitulum.......... 80
  - subglobosum.......... 81
  - ringens.......... 81
  - grandiformis.......... 82
  - sphaeriloculum.......... 83
- Genus Cribrostomoides.......... 83
  - bradyi.......... 83
- Genus Cyclammina.......... 84
  - cancellata.......... 84
  - compressa.......... 85
  - pauciloculata.......... 86
  - pusilla.......... 87
  - bradyi.......... 88
- Genus Lituotuba.......... 88
  - lituiformis.......... 88
- Genus Ammobaculites.......... 89
  - agglutinans.......... 89
  - tenuimargo.......... 90
  - calcareum.......... 90
  - cassis.......... 91
  - cylindricus.......... 92
  - reophaciformis.......... 92
  - pseudospirale.......... 94
- Genus Placopsilina.......... 95
  - cenomana.......... 95
- Genus Trochammina.......... 95
  - squamata.......... 95
  - turbinata.......... 96
  - globigeriniformis.......... 96
- Genus Ammochilostoma.......... 97
  - rotundata.......... 97
- Genus Ammosphaeroidina.......... 98
  - sphaeroidiniformis.......... 98
  - grandis.......... 98
- Genus Sphaerammina.......... 99
  - ovalis.......... 100

Systematic part—Continued.
Family Lituolidae—Continued.
Subfamily Trochammininae—Continued.

Page.

- Genus Ammosphaerulina ... 100
  - adhaerens ... 100
- Genus Nouria ... 101
  - harrisii ... 101
  - compressa ... 102
- Family Textulariidae ... 102
  - Subfamily Spiroplectinae ... 102
    - Genus Spiroplectina ... 102
      - bulbosa ... 102
  - Subfamily Textulariinae ... 103
    - Genus Textularia ... 103
      - sagittula ... 103
        - var. atrata ... 103
        - var. fistulosa ... 104
      - gramen ... 105
      - hauerii ... 105
      - agglutinans ... 106
        - var. fistula ... 107
      - stricta ... 107
      - candeiana ... 109
      - porrecta ... 109
      - vertebralis ... 110
      - aperturalis ... 111
      - catenata ... 112
      - aspera ... 112
      - goësii ... 113
      - flintii ... 113
      - rugosa ... 114
      - siphonifera ... 115
      - semialata ... 116
      - foliacea ... 117
      - immensa ... 118
      - concava ... 119
      - jugosa ... 119
      - excavata ... 120
      - transversaria ... 120
      - crassisepta ... 121
      - pseudocarinata ... 121
      - abbreviata ... 122
      - conica ... 123
      - trochus ... 124
      - quadrilatera ... 125
    - Genus Bigenerina ... 125
      - nodosaria ... 125
      - arenacea ... 126
      - capreolus ... 127
      - pennatula ... 127
    - Genus Bolivina ... 128
      - dilatata ... 128
      - beyrichii ... 128
        - var. alata ... 129

Systematic part—Continued.
Family Textulariidae—Continued.
Subfamily Textulariinae—Continued.
Genus Bolivina—Continued. Page.

robusta ........ 129
schwageriana ........ 130
nobilis ........ 130
karreriana ........ 131
var. carinata ........ 132
hantkeniana ........ 132
amygdalaeformis ........ 133
semicostata ........ 134
sculpturata ........ 134
subangularis ........ 135
limbata ........ 135
pygmaea ........ 136
punctata ........ 136
compacta ........ 137
aenariensis ........ 137
pusilla ........ 138
Genus Pleurostomella ........ 138
alternans ........ 138
subnodosa ........ 139
Subfamily Verneuilininae ........ 139
Genus Verneuilina ........ 139
polystropha ........ 139
propinqua ........ 140
bradyi ........ 141
spinulosa ........ 141
triquetra ........ 142
affixa ........ 142
Genus Valvulina ........ 142
conica ........ 142
fusca ........ 143
Genus Chrysalidina ........ 144
dimorpha ........ 144
Genus Tritaxia ........ 145
tricarinata ........ 145
indiscreta ........ 145
Genus Gaudryina ........ 146
scabra ........ 146
flintii ........ 146
quadrangularis ........ 147
triangularis ........ 148
paupercula ........ 148
bradyi ........ 149
baccata ........ 150
chilostoma ........ 150
pseudofiliformis ........ 151
apicularis ........ 151
attenuata ........ 152
robusta ........ 152
Genus Tritaxilina ........ 153
caperata ........ 153

Systematic part—Continued.
Family Textulariidae—Continued.
Subfamily Verneuilininae—Continued.

Page.
- Genus Clavulina .... 154
  - communis .... 154
  - bradyi .... 155
  - angularis .... 155
  - parisiensis .... 156
  - difformis .... 156
  - rotundata .... 157
  - primaeva .... 158
- Subfamily Bulimininae .... 159
  - Genus Bulimina .... 159
    - elegans, var. exilis .... 159
    - marginata .... 159
    - inflata .... 160
    - buchiana .... 160
    - aculeata .... 161
    - pupoides .... 161
    - pyrula .... 162
      - var. perversa .... 163
      - var. spinescens .... 164
    - ovata .... 164
    - affinis .... 165
    - elongata .... 165
    - subaffinis .... 166
  - Genus Buliminella .... 167
    - subteres .... 167
    - contraria .... 167
    - elegantissima .... 168
  - Genus Virgulina .... 168
    - subsquamosa .... 168
    - pauciloculata .... 168
    - schreibersiana .... 169
    - cornuta .... 170
    - subdepressa .... 170
- Subfamily Cassidulininae .... 171
  - Genus Cassidulina .... 171
    - laevigata .... 171
    - subglobosa .... 171
    - crassa .... 172
  - Genus Ehrenbergina .... 172
    - serrata .... 172
- Family Lagenidae .... 173
  - Subfamily Lageninae .... 173
    - Genus Lagena .... 173
      - globosa .... 173
      - laevis .... 173
      - laevigata .... 174
      - clavata .... 174
      - gracillima .... 175
      - elongata .... 175
      - apiculata .... 176
      - hispida .... 176
        - var. tubulata .... 177

Systematic part—Continued.

Family Lagenidae—Continued.

*Subfamily* Lageninae—Continued.

Genus Lagena—Continued.

Page.

- hexagona, var. scalariformis 177
- striata 177
  - var. haidingeri 178
  - var. strumosa 178
- semistriata 179
- sulcata 179
  - var. apiculata 180
- acuticosta 180
- gracilis 181
- staphyllearia 181
- alveolata, var. substriata 182
- marginata 182
- lagenoides 183
- formosa 183
- bicarinata 184
- lamellata 184

Subfamily Nodosariinae 185

Genus Nodosaria 185

- rotundata 185
- laevigata 185
  - var. striatula 186
- simplex 186
- pyrula 187
  - var. semirugosa 187
  - var. longicostata 188
- annulata 189
- insecta 189
- radicula 190
- insolita 191
- inflexa 191
- soluta 192
- communis 192
- roemeri 193
- filiformis 194
- consobrina, var. emaciata 195
- mucronata 195
- japonica 196
- antennula 197
- subpolygona 198
- catenulata 198
- scalaris 199
  - var. separans 200
- subscalaris 201
  - var. paucicostata 201
- millettii 202
- lepidula 203
  - var. hispidula 203
- substriatula 204
- pauciloculata 205
  - var. luzonensis 206

Systematic part—Continued.

Family Lagenidae—Continued.

Subfamily Nodosariinae—Continued.

Genus Nodosaria—Continued.

Page.

- sublineata 207
- perversa 208
- subperversa 208
- laevicostata 209
- raphanus 210
- obliqua 210
- vertebralis 211
- spirostriolata 212
- subtertenuata 213
- hirsuta 213
  - var. aculeata 214

Genus Lingulina 214

- costata 214
- grandis 215

Genus Frondicularia 216

- inaequalis 216
- philippinensis 216
- annularis 217
  - var. longistriata 218
- plicata 219

Genus Triplasia 219

- tricarinata 219

Genus Cristellaria 220

- cultrata 220
  - var. decorata 221
- reniformis 221
- articulata 222
- rotulata 223
  - var. umbonata 223
- orbicularis 224
  - var. subcarinata 225
  - var. subumbonata 226
  - var. papillata 226
- vortex 227
- convergens 228
- gibba 228
- variabilis 229
- tricarinella 230
  - var. spinipes 230
- calcar 231
- calcarata 232
- echinata 233
- papillosa 234
- aculeata 235
- submamilligera 235
- expansa 236
  - var. planulata 237
- denticulifera 238
- gemmata 239

Systematic part—Continued.

Family Lagenidae—Continued.

Subfamily Nodosariinae—Continued.

Genus Cristellaria—Continued.

Page.

- costata 239
  - var. multicosta 240
  - var. subdecorata 241
  - var. sublaevis 242
- bradyi 243
- cassis 244
- cassinoides 244
- tumido-costata 245
  - var. labyrinthica 246
- dorso-costata 247
- compressa 247
- paucicostata 248
- crepidula 248
- schloenbachi 249
- tenuis 250
- helicina 250
- helicinoides 251
- italica 252
  - var. acuti-carinata 253
- latifrons 254

Genus Marginulina 254

- glabra 254
- striatula 255
- costata 256
- philippinensis 257

Genus Vaginulina 257

- legumen 257
  - var. elegans 258
- spinigera 259
- margaritifera 259
- bradyi 260
- linearis 261
- acicula 262
- protumida 262
- patens 263

Subfamily Polymorphininae 263

Genus Polymorphina 263

- regina 263
- problema 264
  - var. indica 265
- sororia 265
- lactea 265
  - var. oblonga 266
- compressa 266
- gibba 267
- elegantissima 267
- oblonga 268

Subfamily Uvigerininae 269

Genus Uvigerina 269

- pygmaea 269
- tenuistriata 269

Systematic part—Continued.
Family Lagenidae—Continued.
Subfamily Uvigerininae—Continued.
Genus Uvigerina—Continued.
Page.

schwageri 270
angulosa 271
striata 271
selseyensis 272
brunnensis 272
aculeata 273
asperula 274
ampullacea 274
interrupta 275
canariensis 275
scrobiculata 276
Genus Siphogenerina 276
columellaris 276
bifrons 277
var. striatula 278
dimorpha 279
striata 280
raphanus 280
var. costulata 281
Subfamily Ramulininae 282
Genus Ramulina 282
globulifera 282
Family Chilostomellidae 283
Genus Chilostomella 283
ovoidea 283
grandis 283
Genus Allomorphina 284
trigona 284
Family Globigerinidae 285
Genus Globigerina 285
bulloides 285
var. triloba 286
cretacea 287
digitata 288
inflata 289
rubra 289
conglobata 290
sacculifera 291
aequilateralis 293
var. involuta 294
conglomerata 295
Genus Orbulina 295
universa 295
Genus Candeiana 296
nitida 296
var. triloba 296
Genus Sphaeroidina 297
bulloides 297
dehiscens 297

Systematic part—Continued.

Family Globigerinidae—Continued.

Page.

Genus Pullenia 299
sphaeroides 299
quinqueloba 299
obliquiloculata 299
Family Rotaliidae 301
Subfamily Spirillininae 301
Genus Spirillina 301
limbata 301
var. denticulata 302
var. tuberculo-limbata 302
Subfamily Rotalinae 303
Genus Patellina 303
corrugata 303
Genus Discorbis 303
subobtusa 304
vilardeboana 304
orbicularis 305
bertheloti 305
allomorphinoides 306
rugosa 306
species 307
Genus Cymbalopora 308
poeyi 308
var. bradyi 308
Genus Tretomphalus 309
bulloides 309
Genus Planorbulina 310
larvata 310
acervalis 311
Genus Truncatulina 312
refulgens 312
lobatula 313
tenuimargo 313
variabilis 314
wuellerstorfi 314
haidingerii 315
akneriana 316
ungeriana 317
var. ornata 317
tenera 318
praecincta 318
margaritifera 319
culter 320
humulis 321
rostrata 321
Genus Siphonina 322
reticulata 322
Genus Anomalina 322
ariminensis 322
grosserugosa 323
ammonoides 323

Systematic part—Continued.
Family Rotaliidae—Continued.
Subfamily Rotalinae—Continued.
Genus Anomalina—Continued.

Page.
polymorpha .......... 324
var. cervicornis .......... 325
var. siphonifera .......... 325
coronata .......... 326
Genus Pulvinulina .......... 326
repanda .......... 326
concentrica .......... 327
punctulata .......... 328
concamerata .......... 328
auricula .......... 329
oblonga .......... 330
scabra .......... 330
philippinensis .......... 331
indica .......... 332
berthelotiana, var. subornata .......... 333
menardii .......... 333
var. fimbriata .......... 335
lateralis .......... 336
tumida .......... 337
canariensis .......... 338
crassa .......... 338
truncatulinoides .......... 339
umbonata .......... 339
exigua .......... 340
pauperata .......... 340
schreibersii .......... 341
procera .......... 342
elegans .......... 342
partschiana .......... 344
Genus Rotalia .......... 345
beccarii .......... 345
broeckhiana .......... 346
orbicularis .......... 346
schroeteriana .......... 347
papillosa .......... 347
var. compressiuscula .......... 348
soldanii .......... 349
calcar .......... 350
Genus Calcarina .......... 350
spengleri .......... 351
defrancii .......... 353
baculatus .......... 354
hispida .......... 356
Genus Siderolites .......... 357
tetraedra .......... 358
Genus Baculogypsina .......... 359
sphaerulatus .......... 359
Genus Gypsina .......... 360
globulus .......... 360

Systematic part—Continued.
  Family Rotaliidae—Continued.
    Subfamily Rotalinae—Continued.

Page.

      Genus Carpenteria ... 360
          utricularis ... 360
          proteiformis ... 361
          monticularis ... 362
          rhaphidodendron ... 363
      Genus Polytrema ... 363
          miniaceum ... 363
      Genus Homotrema ... 364
          rubrum ... 364
      Genus Sporadotrema ... 365
          cylindricum ... 365
  Family Nummulitidae ... 365
      Genus Nonionina ... 365
          umbilicatula ... 365
          pompilioides ... 366
          boueana ... 366
      Genus Polystomella ... 367
          subnodosa ... 367
          crispa ... 368
          craticulata ... 368
      Genus Amphistegina ... 370
          lessonii ... 370
              var. madagascariensis ... 372
              var. radiata ... 372
      Genus Operculina ... 373
          gaimardi ... 375
          bartschi ... 376
              var. plana ... 377
              var. ornata ... 378
          philippinensis ... 378
          discoidalis ... 379
              var. involuta ... 380
          granulosa ... 381
          elegans ... 381
          ammonoides ... 382
          venosa ... 383
      Genus Heterostegina ... 384
          depressa, var. tuberculata ... 384
          suborbicularis ... 385
      Genus Cycloclypeus ... 386
          guembelianus ... 386
  Family Miliolidae ... 387
    Subfamily Cornuspirininae ... 387
      Genus Cornuspira ... 387
          foliacea ... 387
              var. expansa ... 388
          involvens ... 389
              var. substriatula ... 390
          lacunosa ... 391
          carinata ... 392
          crassisepta ... 392

Systematic part—Continued.
Family Miliolidae—Continued.
Subfamily Cornuspirininae—Continued.

Page.

- Genus Opthalmidium ... 393
  - inconstans ... 393
- Genus Spiroloculina ... 394
  - depressa ... 394
  - canaliculata ... 395
  - grateloupi ... 396
    - var. incisa ... 397
  - acutimargo ... 398
  - tenuimargo ... 399
  - tenuissima ... 400
  - millettii ... 400
  - planissima ... 401
  - tenuiseptata ... 401
  - circularis ... 403
  - orbis ... 403
  - robusta ... 404
  - validus ... 404
  - costifera ... 405
    - var. plena ... 405
  - scrobiculata ... 406
  - elegans ... 406
  - antillarum ... 407
    - var. angulata ... 408
  - convexiuscula ... 409
  - advena ... 410
  - affixa ... 410
  - arenaria ... 411
- Genus Planispirina ... 412
  - contraria ... 412
  - striata ... 413
  - sphaera ... 413
- Genus Vertebralina ... 414
  - striata ... 414
    - var. reticulosa ... 414
- Genus Nodobacularia ... 415
  - tibia ... 415

Subfamily Quinqueloculininae ... 415
- Genus Quinqueloculina ... 415
  - seminulum ... 416
  - vulgaris ... 417
  - lamarckiana ... 418
  - venusta ... 420
  - procera ... 421
  - apicula ... 422
  - limbata ... 422
  - crassa, var. subcuneata ... 423
  - recta ... 423
  - disparilis ... 424
  - boueana ... 425
  - bicornis, var. elegans ... 425
  - curta ... 426

Systematic part—Continued.
Family Miliolidae—Continued.
Subfamily Quinqueloculininae—Continued.
Genus Quinqueloculina—Continued.

Page.

- bicarinata 428
- ferussacii 429
- rugosa 429
- polygona 431
- bradyana 432
- contorta 432
- sculpturata 433
- reticulata 434
- albatrossi 435
- kerimbatica 437
  - var. reticulo-striata 437
  - var. philippinensis 438
- parkeri 440
- agglutinans 441
- sclerotica 441
- fusca 442
- crassatina 443
- alveoliniformis 443

Genus Massilina 444
- secans, var. reticulata 444
  - var. tenuistriata 445
- crenata 445
- durrandii 446
- arenaria 446
- asperula 447

Genus Articulina 448
- sagra 448

Genus Sigmoilina 448
- sigmoidea 448
- schlumbergeri 449

Genus Hauerina 450
- bradyi 450
- fragillissima 451
- ornatissima 452

Genus Triloculina 452
- trigonula 452
  - var. multistriata 453
- advena 453
- tricarinata 454
  - var. convexa 456
  - var. plicata 456
- bertheliniana 457
- terquemiana 458
- insignis 458
- oblonga 459
- rotunda 460
- valvularis 460
- suborbicularis 461
- cuneata 461
  - var. incisa 462

Systematic part—Continued.
Family Miliolidae—Continued.
Subfamily Quinqueloculininae—Continued.
Genus Triloculina—Continued.

Page.
- circularis ........ 462
- linnaeana ........ 463
- rupertiana ........ 464
- tortuosa ........ 464

Genus Flintina ........ 465
- bartschi ........ 465
- triquetra ........ 466
- bradyana ........ 467

Genus Biloculina ........ 469
- depressa ........ 469
- murrhyna ........ 470
- serrata ........ 471
- sarsii ........ 471
- vespertilio ........ 472
- elongata ........ 473
- globulus ........ 474
- anomala ........ 474
- lucernula ........ 475
- pisum ........ 475
- denticulata ........ 476
  - var. striolata ........ 477
- comata ........ 477
- millettii ........ 479
- irregularis ........ 479

Genus Nevillina ........ 480
- coronata ........ 480

Genus Peneroplis ........ 481
- pertusus ........ 481
- planatus ........ 481
- carinatus ........ 482
- arietinus ........ 482
- cylindraceus ........ 483

Genus Orbiculina ........ 483
- adunca ........ 483

Genus Orbitolites ........ 484
- marginalis ........ 484
- duplex ........ 485
- complanata ........ 486
  - var. plicata ........ 487

Genus Alveolina ........ 487
- boscii ........ 487

Explanation of plates ........ 489

Index ........ 591

# LIST OF ILLUSTRATIONS.

Page.

Fig. 1. *Bulimina pyrula* d'Orbigny. × 50. From *Albatross* station D5586. *a–c*, three views of same specimen........................... 162

2. *Bulimina pyrula* d'Orbigny, var. *perversa* Cushman. From *Albatross* station D5654. *a–c*, three views of same specimen............ 163

3. *Bulimina pyrula* d'Orbigny, var. *spinescens* H. B. Brady. × 50. From *Albatross* station D5586............................... 163

4. *Bulimina ovata* d'Orbigny. × 50. From *Albatross* station D5469... 164

5, 6. *Bulimina affinis* d'Orbigny. × 50. From *Albatross* station D5114. 5*a*, *b*, two views of same specimen. 6, another specimen of irregular shape ............................................... 165

7. *Bulimina subaffinis*, new species. Views from different sides. × 100. From station D5201.......................................... 166

8. *Nodosaria pauciloculata*, var. *luzonensis*, new variety. Front view. × 100. From station D5220............................... 206

9. *Cristellaria cultrata*, var. *decorata* Cushman. Side view. × 50. From station D5113............................................ 221

10. *Uvigerina scrobiculata*, new species. × 50. *a*, *b*, two views from different angles. From station D5383....................... 276

11. *Globigerina aequilateralis*, var. *involuta* Cushman. × 50. *a*, side view; *b*, from an oblique angle; *c*, apertural view. From station D5255................................................. 293

12. *Truncatulina ungeriana*, var. *ornata*, new variety. × 100. *a*, dorsal view; *b*, ventral view. From station D5623.................. 317

13. *Operculina bartschi*, new species. Side view. × 15. From station D5134................................................. 376

14. *Operculina bartschi*, var. *plana*, new variety. × 30. Side view. From station D5105......................................... 377

15. *Operculina philippinensis*, new species. Side view. × 15. From station D5134.......................................... 379

16. *Operculina discoidalis*, var. *involuta*, new variety. Side view. × 20. From station D5172....................................... 380

17, 18. *Spiroloculina grateloupi* d'Orbigny. × 50. End views showing aperture and teeth. From *Albatross* station D5136............ 396

19, 20. *Quinqueloculina seminulum* (Linnaeus). × 20. From *Albatross* station D5152. 19, specimen with the tip of the tooth becoming bifid. 20, specimen with the tooth forked and much broadened toward the tip................................................ 416

21. *Quinqueloculina vulgaris* d'Orbigny. × 50. From *Albatross* station D5128. Opposite sides of same specimen................... 417

22, 23. *Quinqueloculina lamarckiana* d'Orbigny. × 50. From *Albatross* station D5220. 22, apertural view of young specimen with simple elongate tooth. 23, adult specimen which has developed a bifid tooth and a more rounded aperture.................. 419

24. *Quinqueloculina rugosa* d'Orbigny. Aperture and undivided simple tooth of early stage. × 150. From *Albatross* station D5164... 430

25-33. *Quinqueloculina albatrossi*, new species. × 50. Various stages in the development of the apertural characters. 25, a simple tooth in a generally rounded aperture. 26–29, a bifid tooth, the aperture

Page.

gradually assuming an irregular form by the development of processes and reëntrants. 30, one arm of the bifid tooth broadening, the other already joined to the side of the aperture. 31, 32, stages in the broadening of the tooth after the central opening is entirely surrounded. 33, a later stage where the sides have fused into the processes leaving a central aperture and six supplementary ones about it.......................... 435

FIG. 34. *Quinqueloculina kerimbatica* Heron-Allen and Earland, var. *philippinensis*, new variety, apertural view. × 50. From *Albatross* station D5164.......................................... 439

35, 36. *Triloculina tricarinata* d'Orbigny. 35, apertural view of broad, peculiarly shaped specimen. × 65. From *Albatross* station D5160. 36, apertural view of a much larger specimen where the outer face has a double angle. × 35. From *Albatross* station D5236.. 454

37. *Triloculina tricarinata* d'Orbigny. Apertural view. × 50. From *Albatross* station D5236.................................... 456

38–40. *Flintina bradyana*, new species. 38, specimen with simple bifid tooth. × 100. From *Albatross* station D5141. 39, specimen in later stage with broadened tooth. × 50. From *Albatross* station D5164. 40, larger specimen with reduced costae, the last-formed chamber smooth, the tooth sending out processes toward the wall at the sides of the aperture. × 50................. 467

41–44. *Flintina bradyana*, new species. × 50. From *Albatross* station D5133. 41*a*, side view; *b*, apertural view of young specimen with simple tooth. 42, aperture of older specimen with bifid tooth. 43, aperture of a still older specimen with the processes of the tooth beginning to extend in and the opening to have angles. 44, aperture of an adult where the arms have met to form a central ring, additional arms extended from either side of the aperture at the angles, and secondary arms being given off on the sides of the ring.......................... 468

45–47. *Biloculina depressa* d'Orbigny. 45, young specimen with elliptical aperture and elongate tooth. × 50. From *Albatross* station D5236. 46, later stage showing the greater elongation of the aperture and tooth. × 100. From *Albatross* station D5201. 47, adult specimen with very narrow curved aperture, largely occupied by the somewhat expanded tooth. × 40. From *Albatross* station D5236.................................. 469

48. *Biloculina sarsii* Schlumberger. × 50. From *Albatross* station D5220. *a*, front view; *b*, side view; *c*, apertural view of same specimen........................................ 471

49, 50. *Biloculina sarsii* Schlumberger. 49, aperture of early stage with a broad, rounded tooth and an elliptical opening. × 80. From *Albatross* station D5178. 50, aperture of an adult specimen with very broad aperture, the tooth very narrow and elongate with the angles produced at each end. × 100. From *Albatross* station D5133.................................. 472

51. *Biloculina comata* H. B. Brady. × 100. Aperture of specimen from *Albatross* station D5236................................ 477

52. *Biloculina comata* H. B. Brady. Outline of the chambers of a partially broken specimen, showing the early quinqueloculine stage with nearly smooth chambers. × 100. From *Albatross* station D5236............................................ 478

# FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

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## INTRODUCTION.

The collections represented by material included in the following report were made by the United States Bureau of Fisheries steamer *Albatross*. During several years the Philippine Expedition made collections covering the waters of the Archipelago and the surrounding waters of the China Sea and Pacific Ocean. In addition, collections were made in the region to the southward about Borneo, Celebes, and the larger East Indies. A part of this southern area is similar to that included in Millett's material, but his was almost entirely from comparatively shallow water, while our material has been largely from much deeper water. The *Challenger* did some dredging in the Philippine Archipelago, one station in 95 fathoms (174 meters) off Cebu, being thoroughly worked by Brady and referred to by others. With these exceptions there are few records for the recent material of the region. As a result, there are many interesting records and undescribed species.

A number of years have now been in part given to this report on the Philippine collections. As the collections include nearly 600 dredging stations, besides shallow-water material, the mechanical work, involving as it has the handling and sorting of many thousands of specimens, has been very time-consuming and laborious. The mounted material includes several thousand slides, including many thousands of actual specimens. These are in the collection of the United States National Museum.

The collections probably represent more completely the area covered than any similar collections for a region of equal size. The tropical character of much of the shallow-water material makes it very interesting from various points of view.

In the study of the collection it has been the purpose to give the distribution of such species in the region, and the tables give the data for these stations. In this way much detailed information is available for the causes affecting distribution of various genera and species. Something is given of the variation where this occurs, and in some cases changes in nomenclature are discussed where necessary. The classification adopted is that already used in an earlier series of papers[1] and in the early parts of another paper now being issued.[2] In these papers will be found more detailed synonymy and the discussion of the classification and changes of name which have occurred in the earlier work. References to these papers and to the *Challenger* Report are given for nearly all the older species. The descriptions of many of the new species have already been published and references to the place of publication given, though for ease of reference the descriptions have been given in full for the species described as new from these collections.

Figures have been given for most of the species and all have been taken from material of this collection. Most of these are drawings, but a few are photographs. Many more figures could well have been used to illustrate the various species and varieties. It would have been of interest to show the developmental stages of numerous species, but this would have involved the drawing of many more figures and a considerable increase in the number of plates.

The work of completing the present report would have been impossible but for the very kindly help which has been unstintingly given. The Bureau of Fisheries under Commissioners George M. Bowers, Dr. Hugh M. Smith, and Deputy Commissioner H. F. Moore, has given unceasing aid in the furnishing of assistance in preparing the material and the work of getting the manuscript and figures in shape. The United States National Museum has taken care of the mounting of the slides of material and help in other ways. That the material is so rich is very largely due to careful work of Dr. Paul Bartsch during the time he had charge of the collecting work of the *Albatross* in the Philippines. Miss Jennie F. Cushman is responsible for the large series of species and specimens which are due to her painstaking work in patiently picking out the foraminifera from the mass of the bottom samples after they were carefully washed. A considerable portion of the figures were drawn by Mr. Edward Gilman, whose excellent work speaks for itself. Messrs. Charles B. Ames. S. N. F. Sanford, and Miss Margaret Birch did much of the card cataloging of records. Miss Jane M. Furber gave much time to the preparing of card records and the earlier part of the manuscript. Especially to Miss Shirley P. Beck are my thanks due for her very efficient and painstaking work in bringing together in systematic shape the various parts of the work, preparing the tables of distribution, and generally getting the manuscript into its final form. Without her careful work it would have been hardly possible to have gotten the whole into its final shape.

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[1] Cushman, Monograph of the Foraminifera of the Pacific Ocean, Bull. 71, U. S. Nat. Mus., pts. 1-6, 1910-1917.

[2] Cushman, Foraminifera of the Atlantic Ocean, Bull. 104, U. S. Nat. Mus., pt. 1, 1918; pt. 2, 1920.

The lack of certain species is perhaps to be based on the lack of fineness of some of the material available, and if finer material had been available in some cases undoubtedly numerous records for smaller species would have been obtained. This is especially noticeable in the case of small things, such as *Lagena*, *Bolivina*, etc., which from the work of others should be abundant in the region.

Except for one or two stations in the Sulu Sea and in the region to the southward most of the material came from depths of less than 1,000 fathoms (1,829 meters), and much of it from shallow water. Some of the shallow water attached species of genera such as *Polytrema*, *Homotrema*, *Sporadotrema*, *Carpenteria*, etc., are undoubtedly abundant, but the larger mollusca and corals to which they would have been attached were not usually studied. Certain of these are probably widely distributed in shallow, warm waters, and where especially looked for were often found to be abundant.

The general relations of the material to that from other regions is interesting. The shallow water fauna, that inside of 30 fathoms (55 meters), is characteristically tropical, most of the genera being those of similar areas in the general Indo-Pacific region, but many of the species being distinct. In such locations the foraminifera make up a large proportion of the bottom samples. Such genera as *Calcarina*, *Baculogypsina*, *Siderolites*, *Operculina*, *Polystomella*, *Heterostegina*, *Cycloclypeus*, etc., as well as the Miliolidae, are abundant under such conditions.

There is an individuality to the fauna, however, which at once separates it from that of the Barrier Reef region of Australia or of the shallow water of the Indian Ocean, as will be noted under various genera.

In the somewhat deeper water, that from 100 to 300 fathoms (183 to 549 meters), there is developed a fauna which is very interesting and perhaps dominated largely by an exceptional development of the Lagenidae. *Nodosaria* and *Cristellaria* are very abundant and represented by numerous and well-developed species and varieties, many of which are new. A good development of *Frondicularia* is an interesting find in the region. This fauna is interesting in comparison with the material obtained by the *Challenger* in 95 fathoms (173 meters), off Cebu. Some of the species which were described by Brady from this station have been almost unknown since until these *Albatross* dredgings were studied. These species have now been found to be abundant and characteristic in many parts of the Archipelago.

In various parts of the region but especially in the colder, deeper portions, there is an exceptional development of arenaceous foraminifera, especially Astrorhizidae and Lituolidae. These, even though under the Equator, have the characteristic genera and many of the species of cold waters in high latitudes. This goes to further prove the wide distribution of these arenaceous forms in cold waters, temperature instead of depth having the greater control in their distribution.

However, many of the species of these arenaceous foraminifera were undescribed and their nearest allied species so far as present distribution is known are far away. These include species of *Haliphysema*, *Dendrophrya*, *Bathysiphon*, etc. They show what other observers have found, especially Heron-Allen and Earland in their work about the British Isles, that arenaceous species often occur in great abundance in very restricted localities. Certain species of the above genera at some of the stations made up a very large percentage of the foraminifera of the bottom material but were not found elsewhere.

One of the most interesting stations in the whole of the *Albatross* dredgings is D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao. The bottom material is of a peculiar brownish color and contains a very unusual assemblage of species, a large number of which have been described here as new. A large number of rare species have also occurred at this station which have not been found elsewhere in the region. A list of the species from this station is given, as well as from other stations of exceptional interest to show the general character of the foraminiferal fauna in some of the various parts of the area.

Globigerina-ooze is developed in some parts of the Sulu Sea and in the southern area. This is rather typical in most of its species but lacks certain ones. This probably may be due to currents and will be mentioned where the Globigerinidae are discussed.

One of the most interesting finds in the region is *Nevillina coronata*, a very rare species and of especial interest from its relationship to other Miliolidae. The great abundance of *Cycloclypeus carpenteri* in certain parts of the area was an unexpected find. It is the largest of the living calcareous foraminifera.

In general the foraminiferal fauna of the Philippine area is that of the Indo-Pacific, including the Hawaiian Islands on the east, the South Sea Archipelagoes, and Australia to the southward, and going westward to the East Coast of Africa, Madagascar, the Red Sea, and in some cases, the Mediterranean. This is only in general, however, and there are many characteristic species of the area which so far as is now known are limited to this region.

The systematic portion follows, giving the species with notes on their distribution in the area.

## A LIST OF SPECIES FROM ALBATROSS STATION D5179, VICINITY OF ROMBLON.

LATITUDE 12° 38′ 15″ NORTH; LONGITUDE 122° 06′ 15″ EAST. DEPTH, 37 FATHOMS (68 METERS). BOTTOM TEMPERATURE, 75.7° F. (24.2° C.). CHARACTER OF BOTTOM, HRD. S.

FAUNA OF SHALLOW WARM WATER WITHIN THE ARCHIPELAGO.

- LITUOLIDAE:
  - *Reophax scorpiurus.*
- TEXTULARIIDAE:
  - *Textularia siphonifera.*
    - *rugosa.*
    - *conica.*
    - *gramen.*
  - *Verneuilina spinulosa.*
- LAGENIDAE:
  - *Cristellaria vortex.*
    - *dorso-costata.*
    - *schloenbachi.*
  - *Polymorphina elegantissima.*
- GLOBIGERINIDAE:
  - *Globigerina sacculifera.*
    - *aequilateralis.*
      - var. *involuta.*
  - *Pullenia obliquiloculata.*
- ROTALIIDAE:
  - *Spirillina limbata.*
    - var. *denticulata.*
    - var. *tuberculo-limbata.*
  - *Truncatulina refulgens.*
  - *Sporadotrema cylindricum.*
  - *Homotrema rubrum.*
  - *Polytrema miniaceum.*
  - *Calcarina baculatus.*
    - *hispida.*
  - *Carpenteria proteiformis.*
  - *Siderolites tetraedra.*
  - *Pulvinulina lateralis.*
    - *elegans.*
    - *menardii.*
    - *scabra.*
    - *concentrica.*
- NUMMULITIDAE:
  - *Amphistegina lessonii.*
    - var. *madagascariensis.*
    - var. *radiata.*
  - *Operculina bartschi.*
    - *philippinensis.*
  - *Heterostegina suborbicularis.*
  - *Polystomella craticulata.*
    - *crispa.*
  - *Cycloclypeus guembelianus.*

MILIOLIDAE:

- *Spiroloculina convexiuscula.*
  - *grateloupi.*
  - *canaliculata.*
  - *orbis.*
  - *antillarum.*
- *Quinqueloculina agglutinans.*
  - *albatrossi.*
  - *alveoliniformis.*
  - *crassa*, var. *subcuneata.*
  - *parkeri.*
  - *rugosa.*
- *Massilina crenata.*
- *Triloculina circularis.*
  - *linneiana.*
  - *suborbicularis.*
  - *tortuosa.*
  - *tricarinata.*
- *Biloculina denticulata.*
  - var. *striolata.*
- *Alveolina boscii.*

## A LIST OF SPECIES FROM ALBATROSS STATION D5201, SOGOD BAY, SOUTHERN LEYTE ISLAND.

LATITUDE 10° 10′ 00″ NORTH; LONGITUDE 125° 04′ 15″ EAST. DEPTH, 554 FATHOMS (1,012 METERS). BOTTOM TEMPERATURE, 52.8° F. (11.5° C.). CHARACTER OF BOTTOM, GY. S, M.

FAUNA OF DEEPER, COOLER WATER WITHIN THE ARCHIPELAGO.

ASTRORHIZIDAE:

- *Rhizammina algaeformis.*
- *Iridia diaphana.*
- *Proteonina testacea.*
- *Technitella legumen.*

LITUOLIDAE:

- *Reophax pilulifer.*
  - *agglutinatus.*
- *Ammobaculites calcareum.*
  - *cylindricus.*
  - *pseudospirale.*

TEXTULARIIDAE:

- *Textularia abbreviata.*
  - *siphonifera.*
  - *quadrilatera.*
  - *porrecta.*
- *Gaudryina bradyi.*
- *Clavulina parisiensis.*
- *Bolivina hantkeniana.*
  - *limbata.*
  - *punctata.*
- *Bulimina inflata.*
  - *aculeata.*
  - *pyrula*, var. *perversa.*
  - *ovata.*

TEXTULARIDAE—Continued.
- *Bulimina pupoides.*
  - *pyrula.*
  - *subaffinis.*
- *Virgulina cornuta.*

LAGENIDAE:
- *Lagena globosa.*
  - *laevigata.*
  - *gracillima.*
- *Cristellaria italica.*
  - *cassinoides.*
  - *echinata.*
  - *articulata.*
  - *submamilligera.*
  - *expansa.*
  - *calcar.*
  - *orbicularis.*
  - *costata.*
  - *crepidula.*
  - *schloenbachi.*
  - *variabilis.*
  - *tricarinata.*
  - *calcarata.*
- *Nodosaria pyrula.*
    - var. *semirugosa.*
    - var. *longicostata.*
  - *filiformis.*
  - *soluta.*
  - *inflexa.*
  - *consobrina*, var. *emaciata.*
  - *mucronata.*
  - *scalaris.*
    - var. *separans.*
  - *pauciloculata.*
  - *raphanus.*
  - *obliqua.*
  - *vertebralis.*
  - *hirsuta.*
    - var. *aculeata.*
- *Frondicularia philippinensis.*
  - *annularis*, var. *longistriata.*
- *Marginulina glabra.*
  - *striatula.*
- *Siphogenerina bifrons.*
    - var. *striatula.*
  - *striata.*
  - *raphanus.*
    - var. *costulata.*
- *Uvigerina pygmaea.*
  - *tenuistriata.*
  - *schwageri.*
  - *aculeata.*
  - *asperula.*
- *Vaginulina patens.*

- GLOBIGERINIDAE:
  - *Globigerina inflata.*
    - *conglobata.*
    - *sacculifera.*
    - *aequilateralis*, var. *involuta*
  - *Orbulina universa.*
  - *Sphaeroidina dehiscens.*
  - *Pullenia obliquiloculata.*
- CHILOSTOMELLIDAE:
  - *Chilostomella ovoidea.*
  - *Allomorphina trigona.*
- ROTALIIDAE:
  - *Discorbis*, species?
  - *Planorbulina larvata.*
  - *Anomalina polymorphina.*
  - *Truncatulina tenuimargo.*
  - *Rotalia soldanii.*
    - *beccarii.*
  - *Calcarina hispida.*
  - *Pulvinulina crassa.*
    - *menardii.*
    - *auricula.*
  - *Cymbalopora poeyi.*
- NUMMULITIDAE:
  - *Amphistegina lessonii.*
  - *Operculina bartschi.*
    - var. *plana.*
    - *philippinensis.*
    - *discoidalis*, var. *involuta.*
  - *Heterostegina depressa*, var. *tubercalata.*
  - *Nonionina boueana.*
  - *Polystomella craticulata.*
    - *crispa.*
- MILIOLIDAE:
  - *Cornuspira carinata.*
  - *Spiroloculina grateloupi.*
    - *canaliculata.*
    - *tenuissima.*
  - *Nodobacularia tibia.*
  - *Quinqueloculina lamarckiana.*
    - *vulgaris.*
  - *Sigmoilina sigmoidea.*
    - *schlumbergeri.*
  - *Triloculina circularis.*
    - *tricarinata.*
  - *Biloculina anomala.*
    - *comata.*
    - *depressa.*
  - *Orbitolites duplex.*
    - *complanata.*

## A LIST OF SPECIES FROM ALBATROSS STATION D5236, PACIFIC OCEAN, EAST COAST MINDANAO.

LATITUDE 8° 50′ 45″ NORTH; LONGITUDE 126° 26′ 52″ EAST. DEPTH, 494 FATHOMS (903 METERS). BOTTOM TEMPERATURE 41.2° F. (5.1° C.). CHARACTER OF BOTTOM, FNE. GY. S.

### FAUNA OF COOL WATER IN MODERATE DEPTHS OUTSIDE THE ISLANDS.

ASTRORHIZIDAE:
- *Rhabdammina abyssorum.*
  - *discreta.*
  - *linearis.*
- *Bathysiphon filiformis.*
  - *rufus.*
  - *rufescens.*
- *Psammosphaera fusca.*
  - *parva.*
- *Proteonina testacea.*
- *Technitella legumen.*
- *Thurammina papillata*, var. *castanea.*
- *Saccorhiza ramosa.*
- *Tolypammina vagans.*
- *Ammolagena clavata.*
- *Jaculella acuta.*
  - *obtusa.*
- *Ammodiscus incertus.*

LITUOLIDAE:
- *Reophax nodulosus.*
  - *pseudobacillaris.*
  - *spiculotestus.*
- *Hormosina elongata.*
  - *ovaliformis.*
- *Haplostiche dubia.*
- *Haplophragmoides canariensis.*
- *Cyclammina cancellata.*
  - *pusilla.*
  - *bradyi.*
- *Lituotuba lituiformis.*
- *Ammobaculites calcareum.*
- *Placopsilina cenomana.*
- *Trochammina squamata.*
  - *globigeriniformis.*
- *Ammosphaeroidina grandis.*
- *Sphaerammina ovalis.*
- *Trochamminoides proteus.*

TEXTULARIIDAE:
- *Textularia stricta.*
  - *flintii.*
  - *quadrilatera.*
  - *rugosa.*
  - *excavata.*
  - *foliacea.*
  - *crassisepta.*

TEXTULARIIDAE—Continued.

- *Gaudryina bradyi.*
  - *baccata.*
  - *chilostoma.*
- *Clavulina communis.*
- *Bigenerina arenacea.*
  - *capreolus.*
  - *pennatula.*
- *Bolivina sculpturata.*
- *Pleurostomella alternans.*
  - *subnodosa.*
- *Verneuilina polystropha.*
  - *propinqua.*
  - *bradyi.*
  - *affixa.*
- *Bulimina inflata.*
  - *pyrula,* var. *perversa.*
- *Buliminella elegantissima.*
  - *contraria.*
- *Cassidulina subglobosa.*

LAGENIDAE:

- *Lagena staphyllearia.*
  - *alveolata,* var. *substriata.*
- *Cristellaria italica.*
  - *cultrata.*
- *Nodosaria laevigata.*
  - var. *striatula.*
  - *pyrula.*
    - var. *semirugosa.*
  - *filiformis.*
  - *soluta.*
  - *annulata.*
  - *insecta.*
  - *insolita.*
  - *inflexa.*
  - *communis.*
  - *consobrina,* var. *emaciata.*
  - *japonica.*
  - *antennula.*
  - *scalaris.*
  - *lepidula.*
    - var. *hispidula.*
  - *subperversa.*
  - *spirostriolata.*
  - *subtertenuata.*
- *Siphogenerina columellaris.*
  - *bifrons,* var. *striatula.*
  - *striata.*
- *Uvigerina pygmaea.*
  - *tenuistriata.*
  - *aculeata.*
  - *asperula.*
  - *ampullacea.*
- *Vaginulina legumen,* var. *elegans.*
  - *protumida.*

GLOBIGERINIDAE:

*Globigerina inflata.*  
*conglobata.*  
*sacculifera.*  
*aequilateralis*, var. *involuta.*  
*Orbulina universa.*  
*Sphaeroidina dehiscens.*  
*Pullenia quinqueloba.*

CHILOSTOMELLIDAE:

*Chilostomella grandis.*

ROTALIIDAE:

*Discorbis rugosa.*  
*subobtusa.*  
*saulcii.*  
*Planorbulina larvata.*  
*Anomalina grosserugosa.*  
*ammonoides.*  
*polymorpha*, var. *cervicornis.*  
var. *siphonifera.*  
*coronata.*  
*Truncatulina refulgens.*  
*humilis.*  
*ungeriana.*  
*lobatula.*  
*wuellerstorfi.*  
*praecincta.*  
*Rotalia soldanii.*  
*broeckhiana.*  
*calcar.*  
*Pulvinulina procera.*  
*schreibersii.*  
*truncatulinoides.*  
*pauperata.*  
*tumida.*  
*menardii.*  
*punctulata.*  
*Tetromphalus bulloides.*

NUMMULITIDAE:

*Operculina bartschi.*  
var. *plana.*  
var. *ornata.*  
*Nonionina pompilioides.*  
*umbilicatula.*

MILIOLIDAE:

*Cornuspira foliacea.*  
*involvens.*  
var. *substriatula.*  
*crassisepta.*  
*Opthalmidium inconstans.*  
*Spiroloculina costifera.*  
var. *plena.*  
*tenuiseptata.*  
*Planispirina contraria.*  
*Nodobacularia tibia.*

**Miliolidae**—Continued.

- *Quinqueloculina apicula.*
  - *vulgaris.*
  - *procera.*
- *Massilina arenaria.*
- *Sigmoilina sigmoidea.*
  - *schlumbergeri.*
- *Triloculina advena.*
  - *insignis.*
  - *oblonga.*
  - *rotundata.*
  - *tricarinata.*
    - var. *plicata.*
  - *trigonula*, var. *multistriata.*
- *Biloculina irregularis.*
  - *lucernula.*
  - *comata.*
  - *depressa.*
  - *vespertilio.*
- *Flintina bartschi.*

## A LIST OF SPECIES FROM ALBATROSS STATION D5650, GULF OF BONI.

Latitude 4° 53′ 45″ South; Longitude 121° 29′ 00″ East. Depth, 540 fathoms (988 meters). Bottom temperature, 40.1° F. (3.5° C.). Character of bottom, gn. m.

### FAUNA OF COLD WATER AT MODERATE DEPTHS IN THE SOUTHERN AREA.

**Astrorhizidae**:

- *Astrorhiza granulosa.*
- *Rhabdammina abyssorum*, var. *radiata.*
  - *irregularis.*
- *Bathysiphon rufus.*
- *Tholosina bulla.*
- *Hyperammina elongata.*
- *Tolypammina vagans.*
- *Dendrophrya ramosa.*
- *Ammolagena clavata.*
- *Ammodiscus incertus.*

**Lituolidae**:

- *Reophax nodulosus.*
    - var. *hormosinoides.*
  - *bilocularis.*
- *Haplostiche dubia.*
- *Cyclammina cancellata.*
  - *compressa.*
  - *pauciloculata.*
- *Ammobaculites calcareum.*
  - *cylindricus.*
  - *globigeriniformis.*

**Textulariidae**:

- *Gaudryina flintii.*
- *Clavulina communis.*
- *Valvulina conica.*
- *Cassidulina subglobosa.*

- LAGENIDAE:
  - *Cristellaria italica.*
    - *cassis.*
    - *latifrons.*
    - *rotulata.*
    - *submamilligera.*
    - *vortex.*
    - *helicina.*
    - *gibba.*
  - *Nodosaria soluta.*
    - *consobrina*, var. *emaciata.*
    - *japonica.*
    - *scalaris.*
      - var. *separans.*
    - *sublineata.*
    - *raphanus.*
  - *Uvigerina aculeata.*
    - *asperula.*
    - *interrupta.*
- GLOBIGERINIDAE:
  - *Globigerina cretacea.*
    - *digitata.*
    - *conglobata.*
  - *Sphaeroidina dehiscens.*
  - *Pullenia obliquiloculata.*
- ROTALIIDAE:
  - *Planorbulina larvata.*
  - *Anomalina polymorphina.*
  - *Truncatulina praecincta.*
  - *Pulvinulina elegans.*
    - *canariensis.*
    - *pauperata.*
    - *tumida.*
    - *menardii.*
- MILIOLIDAE:
  - *Cornuspira carinata.*
  - *Spiroloculina tenuiseptata.*
    - *robusta.*
  - *Massilina arenaria.*
    - *tricarinata.*
    - *valvularis.*
  - *Biloculina depressa.*
    - *vespertilio.*

## LIST OF SPECIES FROM ALBATROSS STATION H4897, SULU SEA, OFF WESTERN MINDANAO.

LATITUDE 7° 46′ 00″ NORTH; LONGITUDE 122° 00′ 00″ EAST. DEPTH, 1,570 FATHOMS (2,871 meters). CHARACTER OF BOTTOM, GY. M., GLOB.

FAUNA OF DEEP WATER IN THE SULU SEA.

- LITUOLIDAE:
  - *Reophax dentaliniformis.*
    - *guttifer.*
  - *Haplophragmoides emaciatum.*

LITUOLIDAE—Continued.
  *Trochammina squamata.*
    *globigeriniformis.*

GLOBIGERINIDAE:
  *Globigerina conglobata.*
    *sacculifera.*
    *aequilateralis*, var. *involuta.*
  *Sphaeroidina dehiscens.*
  *Pullenia obliquiloculata.*

MILIOLIDAE:
  *Spiroloculina tenuiseptata.*
  *Sigmoilina schlumbergeri.*

In many of the distribution tables no catalogue numbers appear, as mounts were not made in all cases. Material examined was recorded. In some of these cases, however, material was subsequently mounted and is available for study, even though the numbers do not appear in the tables.

A further study of these collections, especially in comparison with material from the Atlantic and other areas, will probably show that I have erred in referring many of the Philippine specimens to already described species. Notes on such cases will be made as the work progresses on the western Atlantic collections.

SYSTEMATIC TREATMENT.

# Order FORAMINIFERA.

## Family ASTRORHIZIDAE.

## Subfamily ASTRORHIZINAE.

### Genus ASTRORHIZA Sandahl, 1857.

#### ASTRORHIZA ANGULOSA H. B. Brady.

*Astrorhiza angulosa* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 234, pl. 20, figs. 10-13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 20, fig. 1 (in text); Bull. 104; U. S. Nat. Mus., pt. 1, 1918, p. 10, pl. 3, fig. 2; pl. 4, figs. 1-3.

One specimen referable to this species was found in material dredged from *Albatross* station D5331, off western Luzon, 178 fathoms [illegible] meters): bottom temperature, 54.7° F. (12.6° C.).

*Astrorhiza angulosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s., sh., m... | Rare. |

#### ASTRORHIZA GRANULOSA (H. B. Brady).

Plate 1, fig. 1.

*Marsipella granulosa* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 36, pl. 3, figs. 8, 9.

*Astrorhiza granulosa* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 234, pl. 20, figs. 14-23.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 21, fig. 5 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 12, pl. 5, fig. 4.

Specimens of this species occur in the material dredged by the *Albatross* south of the Equator. The wall in these specimens is very granular, the aperture and sometimes the tube partially closed by sponge spicules. The stations are as follows: D5613, off Celebes, 752 fathoms (1,375 meters), bottom temperature not given; D5650, Gulf of Boni, 540 fathoms (988 meters), bottom temperature 40.1° F. (4.5° C.); and D5668, Macassar Strait, 901 fathoms (1,648 meters), bottom temperature 38.2° F. (3.3° C.).

*Astrorhiza granulosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13308 | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E.... | 540 | 40.1 | gn. m....... | Few. |
| 13309 | U.S.N.M. | ...... | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m....... | Rare. |
| 13305 | U.S.N.M. | ...... | D5668... | 2 23 15 S.; 118 49 00 E.... | 901 | 38.2 | gy. m....... | Few. |

### ASTRORHIZA AGGLUTINATA, new species.

*Description.*—Test irregular in form, flattened, wall composed of agglutinated fragments of other foraminifera, at the type station mainly Globigerinidae; aperture near the border of the test.

Diameter up to 5 mm.

*Type specimen.*—(Cat. No. 13236, U.S.N.M.) from *Albatross* station D5630, south of Patiente Strait, in 569 fathoms (1,081 meters), where it is fairly common.

In its irregular form the species reminds one of *A. arenaria.*

*Astrorhiza agglutinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13236 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m .... | Common. |

## Genus RHABDAMMINA W. B. Carpenter, 1869.

### RHABDAMMINA ABYSSORUM W. B. Carpenter.

Plate 1, fig. 2.

*Rhabdammina abyssorum* M. SARS, Forh. Vid. Selsk. Christiana, 1868, p. 248 (*nomen nudum*).—W. B. CARPENTER, Ann. Mag. Nat. Hist., ser. 4, vol. 4, 1869, p. 288.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 266, pl. 21, figs. 1-13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 24, figs. 8-10, (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 15, pl. 6, fig. 1; pl. 7, fig. 1;

This species has occurred at more than 25 stations. The depths at these stations range from 124 to 940 fathoms (44 to 1,719 meters). There are two forms of this species met with in the dredgings—one with very coarse walls usually found in more shallow water and the other with fine material from deeper water. This division according to depth does not always hold true, however, as those with finely granular material are sometimes found in comparatively shallow water.

The distribution includes the following regions: East and southeast coasts of Mindanao; south and west coasts of Luzon; Palawan Passage; Jolo Sea, north of Tawi Tawi; between Negros and Siquijor;

north of Celebes; between Gillolo and Makyan Islands; Patiente Strait; Buton Strait; Gulf of Boni; and Flores Sea.

*Rhabdammina abyssorum—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperatures. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5236... | 80 50 45 N.; 126 26 52 E .. | 494 | 41.2 | fne. gy. s ... | Common. |
| [illegible] | U.S.N.M. | 8 | D5259... | 11 57 30 N.; 121 42 15 E .. | 312 | 49.3 | gy. m., glob . | Common. |
| [illegible] | U.S.N.M. | 4 | D5261... | 12 30 55 N.; 121 54 24 E .. | 145 | ....... | s. m ........ | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 8 | D5272... | 14 00 00 N.; 120 22 30 E .. | 118 | 57.4 | m. sh., Co. .. | Common. |
| [illegible] | U.S.N.M. | 3 | D5277... | 13 49 15 N.; 120 14 45 E .. | 80 | 58.6 | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E .. | 208 | 50.5 | gy. m. s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5331... | 15 36 45 N.; 119 47 45 E .. | 178 | 54.7 | s. sh. m..... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5348... | 10 57 45 N.; 118 38 15 E .. | 375 | 56.4 | Co., s ....... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5424... | 9 37 06 N.; 121 12 37 E .. | 340 | 50.4 | co. s ........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5425... | 9 37 45 N.; 121 11 00 E .. | 496 | 49.4 | gy. m., co. s . | Rare. |
| | | | D5438... | 15 54 42 N.; 119 44 42 E .. | 297 | 46.2 | gn. m....... | Several. |
| [illegible] | U.S.N.M. | 6 | D5429... | 9 41 30 N.; 118 50 22 E .. | 766 | ....... | gn. m....... | Several. |
| [illegible] | U.S.N.M. | 7 | D5439... | 15 58 15 N.; 119 40 20 E .. | 940 | 36.7 | gn. m....... | Several. |
| [illegible] | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E .. | 310 | 45.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5449... | 13 21 36 N.; 124 00 38 E .. | 300 | ....... | ............... | Several. |
| | | | D5454... | 13 12 00 N.; 123 50 30 E .. | 153 | ....... | ............... | |
| [illegible] | U.S.N.M. | 4 | D5460... | 13 32 30 N.; 123 58 06 E .. | 565 | ....... | gy. m...... | Few. |
| [illegible] | U.S.N.M. | 1 | D5467... | 13 35 27 N.; 123 37 18 E .. | 480 | ....... | gy. m. (m.b.) | Rare. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E .. | 500 | ....... | gn. m. (net). | Rare. |
| [illegible] | U.S.N.M. | 1 | D5470... | 13 37 30 N.; 123 41 09 E .. | 560 | ....... | m........... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E .. | 256 | 53.3 | gn. m. s..... | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E .. | 277 | 53.3 | s............ | |
| [illegible] | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E .. | 476 | 41.1 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5612... | 0 38 00 N.; 121 45 40 E .. | 750 | ....... | ............... | Common. |
| [illegible] | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 124 35 00 E .. | 298 | ....... | gy. & bk. s. (m. b.). | Rare. |
| | | | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | oo. s. m..... | |
| | | | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s. brk. sh.... | |
| | | | D5651... | 4 43 50 S.; 121 23 24 E... | 700 | 38.7 | gn. m ...... | |
| [illegible] | U.S.N.M. | 1 | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Rare. |
| | | | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | |

### RHABDAMMINA ABYSSORUM W. B. Carpenter, var. RADIATA Cushman.

Plate 1, fig. 3.

*Rhabdammina abyssorum*, var. *radiata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 652.

*Description.*—Test with a globular central chamber from which radiate numerous arms, with annular constrictions, largest diameter near the central chamber thence tapering toward the outer end; wall of fine texture, smooth, reddish-brown in color.

*Type specimen.*—Cat. No. 9101, U.S.N.M., from *Albatross* station D5654, Gulf of Boni, 805 fathoms (1,459 meters), bottom temperature 38.3° F. (3.3° C.).

Specimens were also frequent at D5650, 540 fathoms (988 meters), bottom temperature 40.1° F. (4.5° C.), and D5651, 700 fathoms 1,280 meters) bottom temperature 38.7° F. (3.7° C.), both in the Gulf of Boni, and D5640, Buton Strait, 24 fathoms (44 meters).

This certainly seems to be very different from the ordinary form of the species, the number of arms being as many as eight, the annular constrictions and rapidly tapering arms also being distinctive cha acters. It was found only in this restricted region south of th Equator.

*Rhabdammina abyssorum*, var. *radiata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12744 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m...... | Rare. |
| 12736 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m...... | Rare. |
| 12735 | U.S.N.M. | 1 | D5651... | 4 43 50 S.; 121 23 24 E... | 700 | 38.7 | .............. | Rare. |
| 11611 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 806 | 38.3 | .............. | Rare. |
| 12737 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Rare. |

### RHABDAMMINA IRREGULARIS W. B. Carpenter.

Plate 1, fig. 5.

*Rhabdammina irregularis* W. B. Carpenter, Proc. Roy. Soc. London, vol. 1 1869, p. 60.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 26 pl. 21, fig. 9.—Cushman, Bull. 71, U. S. Nat. Mus., 1910, pt. 1, p. 28, figs. 11, 1 (in text); Bull. 104, U. S. Nat. Mus., 1918, pt. 1, p. 17, pl. 8, fig. 1.

In the region along the Equator and southward in the Gulf o Boni, Flores Sea, and Buton Strait this species is frequent at depth ranging from 24 to 1,560 fathoms (44 to 2,853 meters). It occurre at 20 stations in this area, the bottom temperatures, where give ranging from 36.3° to 52.3° F. (2.3° C. to 11.2° C.). In one lot o material from D5385, Ragay Gulf, Luzon, 327 fathoms (598 meters this species occurred with the bottom temperature recorded as 62.4° F (16.8° C.). At some stations the great mass of the dredged materi consisted of this species which was very similar to that from the Gul of California. Some of the specimens show two sets of branche nearly an inch apart. Although the material was dredged in quan tity it adds little to the knowledge of the structure or the initial po tion of the test of this species. Evidently, as previously noted, ther is a point of weakness just above the place of branching where th process of dredging seems sure to break the specimen. The followin localities, mostly in the southern part of the region in deep wate had this species: Ragay Gulf, Luzon; between Gillolo and Makya Islands; Buton Strait; Sibuko Bay, Borneo; between Gillolo an Kayoa Islands; Gulf of Boni; north of Celebes; Patiente Strait; an Flores Sea.

*Rhabdammina irregularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5265... | 12 24 50 N.; 123 08 70 E... | 327 | 62.4 | gy. m....... | |
| | | | D5486... | 9 06 30 N.; 126 00 20 E... | 976 | 52.3 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 20 00 E... | 260 | ....... | .............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m....... | Rare. |
| | | | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | .............. | |
| [illegible] | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. (m. b.). | Rare. |
| [illegible] | U.S.N.M. | 1 | D5622 .. | 0 19 20 N.; 127 28 30 E... | 275 | ....... | gy. m....... | Rare. |
| | | | D5625... | 0 07 00 N.; 127 28 00 E... | 230 | ....... | gy. m. fne. s.. | |
| | | | D5630... | 0 56 30 S.; 128 06 00 E... | 569 | ....... | co. s. m. ..... | |
| [illegible] | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 128 27 20 E... | 1,560 | ....... | gy. m....... | Rare. |
| | | | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Few. |
| [illegible]<br>[illegible]<br>[illegible]<br>[illegible] | U.S.N.M. | 10 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Common. |
| [illegible] | U.S.N.M. | 1 | D5651... | 4 43 50 S.; 121 23 24 E... | 700 | 38.7 | .............. | Rare. |
| [illegible] | U.S.N.M. | 5 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | .............. | Few. |
| [illegible] | U.S.N.M. | 1 | D5656... | 3 17 40 S.; 120 36 45 E... | 484 | 41.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5670... | 1 19 00 S.; 118 43 00 E... | 1,181 | 38.2 | gy. m....... | Few. |

### RHABDAMMINA DISCRETA H. B. Brady.

*Rhabdopleura*, species, G. M. Dawson, Can. Nat., vol. 5, 1870, p. 177, fig. 7.

*Rhabdopleura abyssorum* G. M. Dawson, Amer. Journ. Sci., vol. 1, 1871, p. 206, fig. 7.

*Rhabdammina discreta* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 48; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 268, pl. 22, figs. 11-13.—Cushman, Bull. 71, U. S. Nat. Mus., 1910, pt. 1, p. 27, fig. 13 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 21, pl. 11, fig. 1.

At seven stations specimens referred to this species were found in rather small numbers. These stations are in the Sulu Sea; off the eastern coast of Luzon; and north of Celebes. In depth the stations are between 221 and 958 fathoms (404 and 1,752 meters), and the bottom temperatures from 41.2° to 50.1° F. (5.1° C. to 10° C.).

*Rhabdammina discreta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 217 | U.S.N.M. | 1 | D5127... | 10 02 45 N.; 121 48 15 E... | 958 | 50.1 | gy. m., glob. | Rare. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | |
| | | | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m....... | |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m (net.). | Rare. |
| 216 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Rare. |
| 215 | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 06 00 E... | 569 | ....... | co. s., m..... | Few. |
| [illegible] | U.S.N.M. | 1 | H4896... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob. | Rare. |

### RHABDAMMINA LINEARIS H. B. Brady.

Plate 1, fig. 4.

*Rhabdammina linearis* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 37, pl. 3, figs. 10, 11; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 269, pl. 22, figs. 1–6.—Cushman, Bull. 71, U. S. Nat. Mus., 1910, pt. 1, p. 28, figs. 14*a–f* (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 19, pl. 7, figs. 2–5.

Typical specimens of this species were obtained at nine stations with a rather different distribution from the preceding species, being more widely scattered: Off Manila Bay; Bouro Island; Jolo Sea; north of Celebes; Palawan Passage; and Patiente Strait. In depth these range from 297 to 1,105 fathoms (543 to 2,021 meters). The bottom temperatures where given range from 41.2° to 56.4° F. (5.1° C. to 13.5° C.).

Some of the specimens are very perfect and of large size. In a few cases the bottom material is recorded as coral sand, rather an unusual bottom condition for this species.

*Rhabdammina linearis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 8228 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 12725 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m. g..... | Rare. |
| 12719 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Rare. |
| 12720 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| 12721 | U.S.N.M. | 1 | D5428 .. | 9 18 00 N.; 118 51 15 E.. | 1,105 | 49.7 | gy. m....... | Rare. |
| 12722 | U.S.N.M. | 3 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Few. |
| 12723 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Rare. |
| 12724 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 560 | ....... | co. s., m..... | Rare. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m........ | |

## Genus MARSIPELLA Norman, 1878.

### MARSIPELLA GIGANTEA Cushman.

Plate 1, fig. 6; plate 18, figs. 1, 2.

*Marsipella gigantea* Cushman, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 228, pl. 28, figs. 1, 2.

*Description.*—Test elongate, tubular, straight, or very gently and evenly curved, tapering somewhat from the narrow initial end, and again slightly tapering toward the apertural end; wall composed of elongate spicules firmly cemented by a reddish cement, spicules laid lengthwise of the test or slightly oblique, usually entire or nearly so; test of a reddish-brown color except near the apertural end, which is light gray.

Length up to 25 mm.; diameter in the widest portion, nearly 1 mm.

This species was described from *Albatross* station D5630, south of Patiente Strait, just south of the Equator, 569 fathoms (1,081 meters). One specimen was found at D5460, east coast Luzon, 565 fathoms (1,074 meters). The bottom temperature is not recorded for either of these stations.

This species is much larger than *M. cylindrica* H. B. Brady and has a tapering instead of a cylindrical form.

*Marsipella gigantea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5460 .. | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Few. |
| [illegible] | U.S.N.M. | 2 | | | | | | |

### MARSIPELLA CYLINDRICA H. B. Brady.

*Marsipella cylindrica* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 265, pl. 24, figs. 20–22.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 30, figs. 15, 16 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 24, pl. 8, figs. 4–6; pl. 9, figs. 8, 9.

The only station at which this species was found is *Albatross* D5250, Gulf of Davao, 23 fathoms (42 meters).

But two specimens were found at this station, but those are typical in all respects.

*Marsipella cyclindrica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible]<br>[illegible] | U.S.N.M. | 2 | D5250... | 7 05 05 N.; 125 39 45 E.. | 23 | ....... | co. s......... | Rare. |

## Genus BATHYSIPHON G. O. Sars, 1871.

### BATHYSIPHON FILIFORMIS G. O. Sars.

Plate 2, fig. 1.

*Bathysiphon filiformis* (M. Sars MS) G. O. Sars, Forh. Vid. Selsk. Christiania, 1871 (1872), p. 251.—Norman, Rep. Brit. Assoc., 1880, p. 389.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 248, pl. 26, figs. 15–20.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 31, text figs. 17-21 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 27, pl. 11, figs. 4, 5.

*Description.*—Test free, cylindrical, straight, or more often slightly curved; diameter uniform, tubular, open ends serving as apertures; wall composed of felted sponge spicules and fine sand in varying proportions, rather soft and even somewhat friable; color light gray or white, often with a superficial coating of a black deposit.

Diameter up to 2 mm.; length of Philippine specimens up to 15 mm.

*Distribution.*—This species occurred in considerable numbers from several stations as follows: *Albatross* station D5236, in 494 fathoms (903 meters) east coast of Mindanao; D5460, in 565 fathoms (1,074 meters), east coast of Luzon; D5468 in 569 fathoms (1,081 meters), east coast of Luzon; D5567, in 268 fathoms (490 meters), north of Tawi Tawi, bottom temperature 52° F. (11.1° C.); D5580, in 162 fathoms (297 meters), off Darvel Bay, Borneo, bottom temperature 55.8° F. (13.2° C.); D5585, in 476 fathoms (870 meters), Sibuko Bay, Borneo, bottom temperature 41.1° F. (5° C.); D5591, in 260 fathoms (476 meters), same locality; D5619, in 435 fathoms (796 meters), in Molucca Passage; D5622, in 275 fathoms (503 meters), between Gillolo and Makyan Islands; D5625, in 230 fathoms (421 meters), between Gillolo and Kayoa Islands, and D5668, in 901 fathoms (1,648 meters), in Flores Sea.

The specimens of the deeper, colder waters are larger and better developed than those in the shallower, warmer waters. Practically all the stations are in the deeper waters outside the protected waters of the Archipelago proper.

The texture of the wall is very different in appearance in this species from any of the others in the region.

*Bathysiphon filiformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13404 | U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 13415 | U.S.N.M. | 3 | | | | | | |
| 13958 | U.S.N.M. | 5 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m....... | Few. |
| 13955 | U.S.N.M. | 1 | D5468... | 13 35 30 N.; 123 40 28 E.. | 569 | ....... | gn.m.(m.b.). | Rare. |
| 13960 | U.S.N.M. | 2 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52.0 | fne. s......... | Rare. |
| 13961 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 13962 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |
| 13963 | U.S.N.M. | 3 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | ............... | Rare. |
| 13964 | U.S.N.M. | 2 | D5619... | 0 35 00 N.; 127 14 40 E.. | 435 | ....... | fne. gy. s., m. | Rare. |
| 13965 | U.S.N.M. | 1 | D5622... | Makyan Id. (NE.); N. 66° W. | 275 | ....... | gy. m....... | Rare. |
| 13966 | U.S.N.M. | 4 | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s. | Few. |
| 13967 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Rare. |

### BATHYSIPHON RUFUS de Folin.

Plate 2, fig. 2.

*Bathysiphon rufum* de Folin, Actes Soc. Linn. Bordeaux, vol. 40, 1886, p. 283, pl. 6, figs. 8*a*–*c*.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 267, pl. 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 32, fig. 22 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 29.

*Description.*—Test elongate, somewhat curved, decidedly tapering from the small initial end to the much larger last-developed portion; surface smooth and polished, wall comparatively thick, with numerous annular lines of growth and depressed areas, composed of sponge spicules and a very hard siliceous cement; color reddish-brown.

Length up to 10 mm.; diameter about 0.5 mm. in the widest part.

*Distribution.*—Specimens have occurred at several *Albatross* stations off the east coast of Luzon; Jolo Sea; Gulf of Tomini, Celebes; off Bouro Island; and Gulf of Boni. These stations range in depth from 310 to 1,181 fathoms (567 to 2,160 meters), the average being 744.3 fathoms (1,360 meters). The bottom temperatures where given average 41.2° F. (5.1° C.).

This species has a very different texture from the preceding, the wall being hard, the sponge spicules instead of being irregularly felted, are arranged longitudinally and cemented with a hard, siliceous cement with a smooth, polished surface.

*Bathysiphon rufus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 3413 | U.S.N.M. | 7 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Common. |
| 13083 | U.S.N.M. | 3 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s ........ | Few. |
| 3411 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m........ | Rare. |
| 13065 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m........ | Rare. |
| 13410 | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m........ | Rare. |
| 13412 | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m........ | Few. |
| 13414 | U.S.N.M. | 2 | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gy. m........ | Few. |
| 13409 | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| 13407 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne, gy. s...... | Few. |
| 13406 | U.S.N.M. | 1 | D5127... | 10 02 45 N.; 121 48 15 E.. | 958 | 50.1 | gy. m., glob.. | Rare. |
| 13405 | U.S.N.M. | 3 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m........ | Few. |

## BATHYSIPHON RUFESCENS Cushman.

Plate 2, figs. 3*a*, *b*.

*Bathysiphon rufescens* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 651.

*Description.*—Test elongate, very slightly if at all curved, very slightly tapering, slender, wall marked by annular rings, surface rough, very light yellowish- or reddish-brown, dull.

Diameter up to 0.5 mm.; length up to 15 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9098) from *Albatross* station D5236, in 494 fathoms (903 meters), Pacific Ocean off eastern coast of Mindanao; bottom temperature 41.2° F. (5.1° C.). At this station the species was abundant. It also occurred at D5468, in 569 fathoms (1,081 meters), east coast of Luzon, and D5469, in 560 fathoms (1,024 meters), east coast of Luzon, D5639 in 1,560 fathoms (2,852 meters) in Molucca Sea. It was not found in the warmer, protected water of the Archipelago proper.

This species differs from *B. rufus*, which it most resembles in the rough, granular surface and the very slightly tapering, practically straight test.

*Bathysiphons rufescens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 1440 | U.S.N.M. | 7 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s .... | Common. |
| 12385 | U.S.N.M. | 4 | D5468... | 13 35 39 N.; 123 40 28 E.... | 569 | ....... | gn. m....... | Few. |
| 12387 | U.S.N.M. | 3 | D5469... | 13 37 30 N.; 123 41 09 E.... | 560 | ....... | m........... | Few. |
| 3406 | U.S.N.M. | 3 | D5639... | 3 54 50 S.; 123 27 20 E.... | 1,560 | ....... | gy. m....... | Few. |

### BATHYSIPHON FLAVIDUS de Folin.

*Bathysiphon flavidum* de FOLIN, Actes Soc. Linn. Bordeaux, vol. 40, 1886, p. 27 pl. 6, figs. 5*a–c*.

*Description.*—Test elongate, subcylindrical, nearly straight, marke by annular lines and areas of growth, wall smooth, hard but not po ished, light yellowish-brown except at the apertural end, which whe complete is somewhat rounded and lighter colored.

Diameter 1–2 mm.; length up to 25 mm.

*Distribution.*—The species occurred usually in considerable num bers at the following *Albatross* stations: D5438, in 297 fathoms (54 meters), bottom temperature 46.2° F. (7.7° C.), and D5439, in 94 fathoms (1,719 meters), bottom temperature 36.7° F. (2.6° C. both off the west coast of Luzon; D5447, in 310 fathoms (567 m ters), bottom temperature 45.3° F. (7.2° C); D5460, in 565 fatl oms (1,074 meters); D5468, in 569 fathoms (1,081 meters); D5469, i 500 fathoms (914 meters), and D5470, in 560 fathoms (1,024 meters all off the east coast of Luzon; and D5622, in 275 fathoms (503 me ters), between Gillolo and Makyan Islands.

This material seems to agree very well with de Folin's descriptio and figure of this species. It is smooth but not polished, hard an not felted as in *B. filiformis*.

*Bathysiphon flavidus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13949 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m....... | Rare. |
| 13950 | U.S.N.M. | 4 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | s., Co., gn.m. | Few. |
| 13951 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m....... | Rare. |
| 13952 | U.S.N.M. | 4 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m., Co., s | Few. |
| 13953 | U.S.N.M. | 4 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m. (m.b.) | Few. |
| 13954 | U.S.N.M. | 5 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net).. | Few. |
| 13955 | U.S.N.M. | 3 | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m........... | Few. |
| | | | D5622... | Makyan Id. (N. E.), N. 66° W. | 275 | ....... | gy. m....... | |

### BATHYSIPHON FLAVIDUS de Folin, var. GIGANTEUS Cushman.

Plate 2, figs. 4 *a*, *b*.

*Bathysiphon flavidus* de FOLIN, var. *giganteus* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 651.

*Description.*—Variety differing from the typical mainly in size, the test being much larger up to nearly 3 mm. in diameter and 40–50 mm. in length, the wall smooth and polished instead of dull, as in the smaller, typical form.

*Distribution.*—Type specimen (U.S.N.M. No. 9099) from *Albatross* station D5609, in 1,092 fathoms (3,131 meters), Gulf of Tomini, Celebes, bottom temperature 36.3° F. (2.3° C.). Specimens were also obtained from *Albatross* D5619, in 435 fathoms (796 meters), Molucca Passage; D5622, in 275 fathoms (503 meters), between Gillolo and

Makyan Islands; and D5668 in 901 fathoms (1,648 meters), Macassar Strait, bottom temperature 38.2° F. (3.3° C.).

*Bathysiphon flavidus*, var. *giganteus*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5609... | 00 11 00 S.; 121 16 00 E.. | 1,092 | 36.3 | gn. m....... | |
| [illegible] | U.S.N.M. | 1 | D5619... | 00 35 00 S.; 127 14 40 E.. | 435 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5622... | Makyan Id. (N. E.), N. 60° W. | 275 | ....... | gy. m....... | Rare. |
| | | | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | |

### BATHYSIPHON PAPYRACEUS Cushman.

Plate 2, figs. 5 *a*, *b*.

*Bathysiphon papyraceus* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 651.

*Description.*—Test much elongate, irregularly curved, cylindrical, of even diameter; wall thin, friable, of sponge spicules with a small amount of cement, white in color, with the surface of light grayish-green in irregular bands; lines of growth very prominent.

Diameter up to 3 mm.; length up to 50 mm.

*Distribution.*—This species was extremely abundant at *Albatross* station D5247, in 135 fathoms (243 meters), in the Gulf of Davao. Type specimen, U.S.N.M. No. 9100.

It is very different from the other species of the genus in the very thin wall, which, however, is made up in the same way as the other friable species, and the irregular tube.

*Bathysiphon papyraceus*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ° ′ ″ | | ° F. | | |
| 9100 | U.S.N.M. | 10+ | D5247... | 7 02 N.; 125 38 45 E..... | 135 | ....... | m........... | Abundant. |

## Genus RHIZAMMINA H. B. Brady, 1879.

### RHIZAMMINA INDIVISA H. B. Brady.

Plate 2, fig. 6.

*Rhizammina indivisa* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 277, pl. 29, figs. 5-7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 34, fig. 24 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 32, pl. 12, figs. 7-10.

Tubular specimens with encrusting tests made up mostly of Globigerinidae and apparently belonging to this species were obtained from two stations, H4898, Sulu Sea, 221 fathoms (404 meters), and D5272, China Sea, off southern Luzon, 118 fathoms (216 meters). At the latter station the tubes were very common. At this station the bottom temperature was 57.4° F. (14.1° C.).

*Rhizammina indivisa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12850 | U.S.N.M. | 3 | D5272...<br>H4898... | 14 00 00 N.; 120 22 30 E..<br>7 43 45 N.; 122 03 45 E.. | 118<br>221 | 57.4<br>....... | m., sh., co. s.<br>gy. m., glob. | Few. |

### RHIZAMMINA ALGAEFORMIS H. B. Brady.

*Rhizammina algaeformis* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 39, pl. 4, figs. 16, 17; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 274, pl. 28, figs. 1-11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 272, pl. 15, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 33, fig. 23 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 31, pl. 11, figs. 2, 3.

There is a single specimen of this species from *Albatross* station D5201, Sogod Bay, southern Leyte, in 554 fathoms (1,012 meters). This is very similar to the specimens I have previously figured.[3]

*Rhizammina algaeformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13239 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m..... | Rare. |

## Subfamily SACCAMMININAE.

### Genus PSAMMOSPHAERA F. E. Schulze, 1875.

### PSAMMOSPHAERA FUSCA F. E. Schulze.

*Psammosphaera fusca* F. E. Schulze, II Jahr. Comm. Wiss. Unt. deutsch. Meer in Kiel, 1875, p. 113, pl. 2, figs. 8*a-f*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 249, pl. 18, figs. 1, 5-8 (not 2-4).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 35, figs. 25-28 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 35, pl. 13, figs. 1-6; pl. 14, figs. 1-3.

Both attached and free specimens have occurred in the dredgings, but the species has been noted at but three stations: D5236, 494 fathoms (903 meters), eastern coast of Mindanao; D5268, 170 fathoms (311 meters), Batangas Bay; and D5301, 208 fathoms (381 meters), China Sea. The bottom temperature at the latter station is given as 50.5° F. (10.2° C.), for station D5236, 41.2° F. (5.1° C.), and none is recorded for D5268.

*Psammosphaera fusca—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13255 | U.S.N.M. | ...... | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Rare. |
| 13253 | U.S.N.M. | ...... | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 13254 | U.S.N.M. | ...... | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s. p.......... | Rare. |

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[3] Bull. 104, pl. 11, fig. 2.

### PSAMMOSPHAERA PARVA Flint.

Plate 2, fig. 7.

*Psammosphaera parva* FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 268, pl. 9, fig. 1.—RHUMBLER, Arch. Protistk., vol. 3, 1903, p. 242, fig. 77 (in text).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 36, figs. 29, 30 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 35, pl. 12, figs. 4-6.

*Psammosphaera fusca* (part) H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 250, pl. 18, figs. 2-4 (not 1, 5-8).

Typical specimens of this species occurred at D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (963 meters), bottom temperature 41.2° F. (5.1° C.); D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5300, China Sea, vicinity of southern Luzon, 265 fathoms (485 meters), and D5601, Gulf of Tomini, Celebes, 765 fathoms (1,399 meters).

*Psammosphaera parva—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5601... | 1 13 10 N.; 125 17 06 E.. | 765 | ....... | s., glob., ptr. | Rare. |
| [illegible] | U.S.N.M. | ...... | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | ...... | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s .... | Rare. |

## Genus IRIDIA Heron-Allen and Earland, 1914.

### IRIDIA DIAPHANA Heron-Allen and Earland.

*Iridia diaphana* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, pt. 12, 1914, p. 371, pl. 36.

This species, described by Heron-Allen and Earland from the Kerimba Archipelago, has not, so far as I have seen, occurred in its typical form in the Philippine material. There are two specimens, however, which have the thin membrane at the base, and are covered on the upper surface with sand grains and other foraminiferal tests. These may possibly belong to this species.

They are from D5201, Sogod Bay, southern Leyte, in 554 fathoms (1,012 meters), and D5282, China Sea, off southern Luzon, in 248 fathoms (454 meters).

*Iridia diaphana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s.... | Rare. |

## Genus SACCAMMINA W. B. Carpenter, 1869.

### SACCAMMINA SPHAERICA G. O. Sars.

*Saccammina sphaerica* M. Sars, Forh. Vid. Selsk. Christiania, 1868 (1869), p. 2 (*nomen nudum*).—G. O. Sars, Forh. Vid. Selsk. Christiania, 1871, p. 250.- H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 253, pl. 18, fig 11-15, 17.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 39, figs. 33- (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 44, pl. 16, figs. 4-5; p 19, figs. 2-5.

The typical form of this species has been seen but twice in this l of material. It occurred at *Albatross* station D5260, off southeaster Mindoro, 234 fathoms (428 meters), bottom temperature 51.4° (10.7° C.), and D5447, off the eastern coast of Luzon, 310 fathom (567 meters), bottom temperature 45.3° F. (7.2° C.).

*Saccammina sphaerica—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13221 | U.S.N.M. | ...... | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s..... | Rare. |
| 13222 | U.S.N.M. | ...... | D5447... | 13 28 00 N.; 123 46 18 E... | 310 | 45.3 | gn. m........ | Rare. |

### SACCAMMINA SPHAERICA G. O. Sars, var. CATENULATA Cushman.

Plate 2, fig. 8.

*Saccammina sphaerica* H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 253, pl. 18, fig. 16.

*Saccammina sphaerica*, var. *catenulata* Cushman, Proc. U. S. Nat. Mus., vol. 51 1917, p. 652.

*Description.*—Wall of test like that of typical *S. sphaerica* i structure, but several chambers present, joined together in a linea series, the largest chamber adherent.

One specimen almost exactly like the figured specimen of Brad was found at *Albatross* station D5637, Bouro Island, 700 fathom (1,280 meters). This seems to be different from the typical *S* *sphaerica* and may be worthy of more than varietal rank. The sev-eral chambers attached by the largest make it a very different test In the figure given by Brady a pebble forms the base for attach-ment; in this case the specimen is attached to another foraminifer

*Saccammina sphaerica*, var. *catenulata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 9150 | U.S.N.M. | ...... | D5637... | 3 53 20 S.; 126 48 00 E.... | 700 | ....... | gy. m....... | Rare. |

### Genus PROTEONINA Williamson, 1858.

#### PROTEONINA DIFFLUGIFORMIS (H. B. Brady).

*Reophax difflugiformis* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 51, pl. 4, figs. 3a, b; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 289, pl. 30, figs. 2-4 (not 1, 5).

*Proteonina difflugiformis* Rhumbler, Arch. Protistk., vol. 3, 1903, p. 245, figs. 80a, b.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 41, figs. 40, 41 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 47, pl. 21, figs. 1, 2.

The only stations at which this species occurred were *Albatross* D5126, Sulu Sea, vicinity southern Panay, 742 fathoms (1,357 meters), bottom temperature 49.5° F. (9.7° C.); D5300, 265 fathoms (485 meters), China sea, vicinity southern Luzon, no bottom temperature; and D5526, between Siquijor and Bohol Islands, 805 fathoms (1,459 meters), bottom temperature 52.3° F. (11.2° C.).

As this material is typical it is very probable that the species occurs more widely distributed, but is missing on account of the lack of very fine material from most of the stations.

*Proteonina difflugiformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 13427 | U.S.N.M. | ...... | D5126... | 10 34 45 N.; 121 47 30 E... | 742 | 49.5 | sft. gn. m ... | Rare. |
| 13409 | U.S.N.M. | ...... | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Rare. |
| 13408 | U.S.N.M. | ...... | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s..... | Rare. |

#### PROTEONINA FUSIFORMIS Williamson.

*Proteonina fusiformis* Williamson, Recent Foraminifera of Great Britain, 1858, p. 1, pl. 1, fig. 1.—Rhumbler, Arch. Protistk., vol. 3, 1903, p. 248, fig. 84 (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 41, fig. 39 (in text).

*Reophax fusiformis* H. B. Brady, Denkschr. Kongl. Akad. Wiss. Wien, vol. 43, pt. 2, 1882, p. 99; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 290, pl. 30, figs. 7-11.

The only records for this species are two not entirely typical specimens from *Albatross* station D5551, Jolo Island. These have the general form of the species and are composed of sand grains and fine shell fragments.

These specimens are not unlike those figured by Heron-Allen and Earland,[4] which they refer to *Thurammina papillata*.

*Proteonina fusiformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | 2 | D5551... | 5 54 48 N.; 120 44 24 E.... | 198 | 53.3 | fne. s........ | Rare. |

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[4] Journ. Roy. Micr. Soc., 1917, pl. 27, figs. 18-20.

### PROTEONINA TESTACEA (Flint).

*Reophax difflugiformis* H. B. Brady, var. *testacea* Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl. 16, fig. 1.

*Proteonina testacea* Cushman, Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 49, pl. 20, figs. 1–4.

At the following six stations this species occurred, at some in very considerable numbers; D5201, Sogod Bay, southern Leyte, 554 fathoms (1,012 meters), bottom temperature, 52.8° F. (11.5° C.); D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature, 41.2° F. (5.1° C.); D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature, 49.3° F. (9.6° C.); D5281, China Sea, vicinity southern Luzon, 201 fathoms (368 meters), bottom temperature, 50.4° F. (10.2° C.); D5470, east coast of Luzon, San Bernardino Strait to San Miguel Bay, 560 fathoms (1,024 meters); and D5613, north of Celebes, 752 fathoms (1,375 meters).

These specimens, occurring in material containing a considerable number of Globigerinidae, are made almost entirely of such tests. The aperture is at the end of a definite and somewhat produced neck.

*Proteonina testacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15667 | U.S.N.M. | 10+ | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 52.8 | gy. m., s.... | Common. |
| 12812 | U.S.N.M. | ...... | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m....... | Common. |
| 12809 | U.S.N.M. | ...... | D5470... | 13 37 30 N.; 123 41 09 E.... | 560 | ....... | m........... | Few. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s..... | Few. |
| 12811 | U.S.N.M. | ...... | D5259... | 11 57 30 N.; 121 42 15 E.... | 312 | 49.3 | gy. m., glob. | Few. |
| 12810 | U.S.N.M. | ...... | D5281... | 13 52 45 N.; 120 25 00 E.... | 201 | 50.4 | dk. gy. s.... | Few. |

## Genus TECHNITELLA Norman, 1878.

### TECHNITELLA LEGUMEN Norman.

*Technitella legumen* Norman, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 279, pl. 16, figs. 3, 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 246, pl. 25, figs. 8–12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 48, fig. 53 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 59, pl. 9, figs. 1, 2; pl. 10, fig. 1; pl. 16, figs. 7, 8; pl. 24, figs. 3–5; pl. 26, fig. 5.

Specimens of this species do not seem to be common in the region, but single specimens have occurred at six stations not very far apart. In all cases the specimens were typical. The stations are as follows: D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature, 52.8° F. (11.5° C.); D5236, eastern coast Mindanao, 494 fathoms (903 meters), bottom temperature, 41.2° F. (5.1° C.); D5242, Pujada Bay, 191 fathoms (350 meters), bottom temperature, 64.1° F. (17.8° C.); D5243, same general locality, 218 fathoms (399 meters), bottom temperature, 63.6° F. (17.5° C.); D5248, Gulf of Davao, 18 fathoms (33 meters); and D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature, 49.3° F. (9.6° C.). In all cases the bottom temperatures are high and not what would be expected from the distribution of this species elsewhere.

These specimens show the typical structure of long acerate spicules arranged lengthwise of the test in the outer layer, and those of the inner layer arranged horizontally around the interior at right angles to those of the outside.

*Technitella legumen—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | ........ | 1 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 52.8 | gy. s., m..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5243... | 6 50 55 N.; 126 14 35 E.... | 218 | 63.6 | gy. m........ | Rare. |
| | ........ | 1 | D5242... | 6 51 53 N.; 126 14 10 E.... | 191 | 64.1 | sft. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5248... | 7 07 25 N.; 125 40 24 E.... | 18 | ........ | Co.......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.... | 312 | 49.3 | gy. m., glob. | Rare. |

## Genus THOLOSINA Rhumbler, 1895.

### THOLOSINA BULLA (H. B. Brady).

Plate 3, figs. 1, 2; plate 4, fig. 4.

*Placopsilina bulla* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315, pl. 35, figs. 16, 17.

*Tholosina bulla* RHUMBLER, Nachr. kon. Ges. Wiss. Göttingen, 1895, p. 82.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 49, figs. 58*a*, *b* (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 63, pl. 25, fig. 6.

Specimens of this species attached to *Rhabdammina*, usually *R. irregularis*, and occasionally to *Hyperammina*, have been found at several stations. The specimens usually have a single, undivided chamber, but occasionally it is partially or wholly divided into two portions.

The typical form of the species somewhat broken and showing the interior is given in plate 4, figure 4. A very hispid variety is shown in plate 3, figure 1, and a form with a prominent aperture rising somewhat from the surface in plate 3, figure 2. This form of aperture seems always to be accompanied by a smooth surface.

The following localities are represented: Ragay Gulf, Luzon; Jolo Sea; between Negros and Siquijor, Sibuko Bay, Borneo; Gulf of Boni; and Flores Sea.

*Tholosina bulla—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s........ | Rare. |
| [illegible] | U.S.N.M. | ...... | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | ...... | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5651... | 4 43 50 S.; 121 23 24 E... | 700 | 38.7 | gn. m....... | Rare. |

## Genus THURAMMINA H. B. Brady, 1879.

### THURAMMINA PAPYRACEA Cushman.

Plate 3, fig. 3.

*Thurammina papyracea* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 637, pl. 7
fig. 4.

*Description.*—Test spherical, wall extremely thin and delicat composed of fine sand grains, sponge spicules and a brownish cement apertures very small and inconspicuous.

Diameter 1.5 mm.

*Type specimen.*—(Cat. No. 8511, U.S.N.M.) from *Albatross* station D5613, north of Celebes, 752 fathoms (1,375 meters).

This is a large species with a paper-thin wall and very inconspicu ous apertures.

Specimens were found at the following six stations: D5469, eas coast of Luzon, 500 fathoms (914 meters); D5470, the neighborin station, 560 fathoms (1,024 meters); D5612, Gulf of Tomini, Celebe 750 fathoms (1,370 meters); D5613, 752 fathoms (1,375 meters) D5637 south of Patiente Strait, 700 fathoms (1,280 meters); an D5668 Macassar Strait, 901 fathoms (1,648 meters). The botto temperature was given in but one case—D5668, 38.2° F. (3.4 C.°)

*Thurammina papyracea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12791 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m........ | Rare. |
| 12792 | U.S.N.M. | 2 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............ | Rare. |
| 12793 | U.S.N.M. | 4 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............. | Few. |
| 8511<br>12749 | U.S.N.M. | 3 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Few. |
| 12795 | U.S.N.M. | 2 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Few. |
| 12796 | U.S.N.M. | 3 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m........ | Few. |

### THURAMMINA PAPILLATA H. B. Brady, var. CASTANEA Heron-Allen and Earland.

*Thurammina papillata* H. B. Brady, var. *castanea* Heron-Allen and Earland Journ. Roy. Micr. Soc., 1917, p. 545, pl. 26, figs. 14–18; pl. 29, fig. 17.

There is a single specimen from D5236, Pacific Ocean, east coa of Mindano, in 494 fathoms (903 meters) which has a reddish-brow color and numerous blunt papillae, with a very fine opening at th end of each.

This is evidently the variety which Heron-Allen and Earland d scribe and figure in the above reference. No other specimens refe able either to this variety or to the species were found in the region, all others being referred to our species, *T. papyracea*.

*Thurammina papillata*, var. *castanea*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |

## Subfamily HYPERAMMININÆ.

### Genus HYPERAMMINA H. B. Brady, 1878.

### HYPERAMMINA ELONGATA H. B. Brady.

Plate 3, fig. 5.

*Hyperammina elongata* H. B. BRADY (part), Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 433, pl. 20, figs. 2*a*, *b*; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 257, pl. 23, figs. 4, 7 (not 9, 10).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 60, figs. 73, 74 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 74, pl. 29, fig. 4.

Tubular specimens referable to this species have been obtained at a number of stations well scattered throughout the region, depths varying from 248 to 1,105 fathoms (454 to 2,021 meters). As a rule the proloculum of specimens is missing, but was present in one complete specimen among others from D5470 in 560 fathoms (1,065 meters), off the east coast of Luzon. The smooth species, *H. laevigata*, was not found at all in any of the dredgings.

*Hyperammina elongata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | ...... | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m....... | |
| [illegible] | U.S.N.M. | 6 | D5250... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m....... | Few. |
| | | ...... | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | |
| | | ...... | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m....... | |
| [illegible] | U.S.N.M. | 5 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy.m.(m.b.). | Few. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 34 24 E... | 500 | ....... | gn.m.(net).. | Rare. |
| [illegible] | U.S.N.M. | 3 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m.......... | Few. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............ | |
| | | | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m....... | |
| | | | D5630... | 6 56 30 S.; 128 05 00 E... | 569 | ....... | co.s., m..... | |
| [illegible] | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |

### HYPERAMMINA FRIABILIS H. B. Brady.

Plate 3, fig. 4.

*Hyperammina elongata* H. B. BRADY (part), Ann. Mag. Nat. Hist., ser. 5, vol. 1 1878, p. 433.

*Hyperammina friabilis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884 p. 258, pl. 23, figs. 1–3, 5, 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 191 p. 62, fig. 76 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 75, pl. 2 figs. 1–3.

Very fine and complete specimens, showing the proloculum intact were found at a number of stations in the region.

It is worth noting here that in the Atlantic *H. friabilis* was foun in comparatively warm waters, while *H. subnodosa* was limited t very low temperatures. As all these stations in the Philippine are here noted have relatively high temperatures, the frequency of *H friabilis* and complete lack of *H. subnodosa* is very significant.

The localities for this species in the region include China Sea, o Hongkong; Palawan Passage; Jolo Sea; eastern Palawan; betwee Leyte and Mindanao; between Negros and Siquijor; north of Celebes off Bouro Island; and in Buton Strait.

*Hyperammina friabilis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15344 | U.S.N.M. | 6 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 12803 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m. s...... | Rare. |
| 12802 | U.S.N.M. | 4 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co. s......... | Few. |
| 12804 | U.S.N.M. | 2 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Few. |
| 12805 | U.S.N.M. | 3 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s.. | Few. |
| | | | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m......... | |
| 12806 | U.S.N.M. | 3 | D5496... | 9 06 30 N.; 125 00 28 E... | 976 | 52.3 | gy. m ...... | Few. |
| 12807 | U.S.N.M. | 3 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Few. |
| 12808 | U.S.N.M. | 10+ | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ........ | ............... | Common. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ........ | gy. m......... | |
| | | | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ........ | s., brk. sh.... | |

## Genus SACCORHIZA Eimer and Fickert, 1899.

### SACCORHIZA RAMOSA (H. B. Brady).

Plate 4, fig. 5.

*Hyperammina ramosa* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 33, p 3, figs. 14, 15; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 261, pl. 23, figs. 15–1

*Saccorhiza ramosa* EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1899, p. 670.– CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 65, fig. 81 (in text); Bul 104, U. S. Nat. Mus., pt. 1, 1918, p. 81, pl. 30, figs. 3, 4.

Specimens of this species have been noted in material from 20 o more stations in the region. A considerable number of these station were off the east coast of Luzon, in 310 to 569 fathoms (567 to 1,08 bottom temperature, where recorded, 44.3° F. (6.8° C.)

In addition there were scattered stations covering the whole area rather well.

It will be noted that the bottom temperatures from some of these stations were relatively high and yet much of the material was from deep water. A number of specimens were obtained with the proloculum intact. There seem to be both microspheric and megalospheric forms with smaller but longer and more branching tubes, and the latter form of the specimens showed tubes twice branched. There is some considerable variation in regard to the comparative amount of included spicules.

*Saccorhiza ramosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh... | |
| | | | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m..... | |
| [illegible] | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few |
| [illegible] | U.S.N.M. | 4 | | | | | | |
| [illegible] | U.S.N.M. | 4 | D5238... | 7 34 45 N.; 126 38 15 E.. | 380 | 43.0 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 4 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s ........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s ........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5438 ... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m. s..... | Few. |
| [illegible] | U.S.N.M. | 5 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m...... | Few. |
| [illegible] | U.S.N.M. | 3 | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m. (m. b) | Rare. |
| [illegible] | U.S.N.M. | 3 | D5468... | 13 35 39 N.; 123 40 28 E.. | 560 | ....... | gn. m. (m. b.) | Few. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net). | Rare. |
| | | | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | |
| [illegible] | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. & bk. s. (m. b.) | Few. |
| [illegible] | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 05 00 E.. | 560 | ....... | co. s., m.... | Few. |
| [illegible] | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m......... | Few. |
| [illegible] | U.S.N.M. | 5 | Nero 842 | 15 22 00 N.; 122 08 30 E.. | 1,830 | ....... | br. m., s.... | Few. |

## Genus TOLYPAMMINA Rhumbler, 1895.

### TOLYPAMMINA VAGANS (H. B. Brady).

Plate 4, figs. 2, 3; plate 7, figs. 1, 2.

*Hyperammina vagans* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 33, pl. 3, fig. 5; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 260, pl. 24, figs. 1–9.

*Tolypammina vagans* Rhumbler, Nachr. kön. Ges. Wiss. Göttingen, 1895, p. 83; Zeitschr. allg. Phys., vol. 2, 1902, p. 281, fig. 97; Arch. Protistk., vol. 3, 1903, p. 277, figs. 125*a*, *b* (in text).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 67, fig. 85 (in text).

*Serpulella vagans* Eimer and Fickert, Zeitschr. wiss. Zool., vol. 65, 1899, p. 674.

*Girvanella vagans* Rhumbler, Foram. Plankton Exped., pt. 1, 1911, pl. 4, figs. 1, 2; pt. 2, 1913, p. 419.—Cushman, Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 91, pl. 35, figs. 4, 5; pl. 36, fig. 1.

At 15 or more stations numerous typical specimens of this species have occurred. They have been found attached to *Rhabdammina* most frequently, but also have been noted upon *Hormosina glob-*

*ulifera*, *Trochammina turbinata*, *Haplophragmoides subglobosum*, *Ammodiscus incertus*, *Bathysiphon* and *Bigenerina*.

The localities include the east and west coasts of Luzon; east coast of Mindanao, Palawan Passage; Sibuko Bay, Borneo; north of Celebes; Molucca Sea; Gulf of Boni; and Flores Sea.

*Tolypammina vagans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8234<br>12779<br>12781 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| | | | D5348... | 7 67 25 N.; 125 40 24 E.. | 18 | ....... | Co........... | |
| | | | D5385... | 13 24 50 N.; 123 03 70 E.. | 327 | 62.4 | gy. m....... | |
| 14002 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| 12786 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m........ | Rare. |
| 12785 | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E.. | 300 | ....... | .............. | Rare. |
| 14001 | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m. (m.b). | Rare. |
| 12778 | U.S.N.M. | 2 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |
| 12780 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | .............. | Rare. |
| | | | D5639... | 3 54 08 S.; 128 27 20 E.. | 1,500 | ....... | gy. m........ | |
| 12782 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | Rare. |
| 12783 | U.S.N.M. | 1 | D5651... | 4 43 50 S.; 121 23 24 E.. | 700 | 38.7 | .............. | Rare. |
| | | | D5654... | 3 42 00 S.; 120 45 50 E.. | 805 | 38.3 | .............. | |
| | | | D5658... | 3 32 40 S.; 120 31 30 E.. | 310 | 41.2 | gy. m........ | |
| | | | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m........ | |
| 12784 | U.S.N.M. | 2 | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gy. m........ | Rare. |
| 14758 | U.S.N.M. | 1 | *Nero* 838 | 15 25 00 N.; 122 12 40 E. | 1,406 | ....... | br., m., s.... | Rare. |

## Genus DENDROPHRYA Str. Wright, 1861.

### DENDROPHRYA RAMOSA Cushman.

Plate 18, figs. 7, 8.

*Dendrophrya ramosa* CUSHMAN, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 227, pl. 28, figs. 7, 8.

*Description.*—Test large, laterally compressed, branching, wall with a chitinous base, over which there is a thick layer of mud or fine sand and scattered sponge spicules; apertures at the ends of the branching portions, elliptical.

Length 10 mm. or more.

*Type specimen.*—Cat. No. 8463, U.S.N.M., from *Albatross* station D5385, Ragay Gulf, Luzon, 327 fathoms (598 meters), with a bottom temperature of 62.4° F. (16.8° C.). Other stations at which this species occurred are D5438, west coast Luzon, 297 fathoms (543 meters), bottom temperature, 46.2° F. (7.8° C.); D5460, east coast Luzon, 565 fathoms (1,074 meters); D5470, 560 fathoms (1,065 meters); D5622, between Gillolo and Makyan Islands, Dutch East Indies, 275 fathoms (503 meters); D5630, south of Patiente Strait, 569 fathoms (1,081 meters); and D5650, Gulf of Boni, 540 fathoms (988 meters); bottom temperature, 40.1° F. (3.5° C.).

This species evidently belongs to the genus *Dendrophrya*, as described, but is much larger than either of the other two described species. The figured specimen is evidently only a fragment, as are all the specimens seen, and the complete test must be considerably larger. There is some variation in the color and texture of the wall and the comparative amount of spicules, depending somewhat upon the bottom conditions. All the stations are in fairly deep water compared with the shore conditions under which the other two known species were found. Usually specimens were very numerous, making up the large mass of the dredged material at the type station.

*Dendrophrya ramosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13105 | U.S.N.M. | ...... | D5438 .. | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn.m........ | Few. |
| | | | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy.m........ | |
| 13103 | U.S.N.M. | ...... | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co.s.,m ..... | Rare. |
| 13102 | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn.m........ | Rare. |
| 13104 | U.S.N.M. | ...... | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co.s.,m ..... | Rare. |
| 13228<br>8463 | U.S.N.M. | ...... | D5385... | 13 24 50 N.; 123 03 70 E.. | 327 | 62.4 | gy. m........ | Common. |
| | | | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | M........... | |
| | | | D5622 .. | Makyan Id.(NE.),N.66°W. | 275 | ....... | gy.m....... | |

### DENDROPHRYA RAMOSA Cushman, var. ROBUSTA, new variety.

*Description.*—This variety differs from the typical in having a coarser, broader test, with the branches less flattened and the main portion of the test broad and flattened.

*Length* 8 mm. (type specimen).

*Type specimen.*—(Cat. No. 13235, U.S.N.M.) from *Albatross* station D5637, south of Bouro Island, in 700 fathoms (1,280 meters).

This has a very different external appearance from the typical form of the species, mostly in its coarse and broad test.

*Dendrophrya ramosa*, var. *robusta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13235<br>11835 | U.S.N.M. | 10+ | D5637... | 3 58 20 S.; 120 48 00 E.... | 700 | ....... | gy.m....... | Common. |

### DENDROPHRYA ATTENUATA Cushman.

Plate 4, fig. 1.

*Dendrophrya attenuata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 652.

*Description.*—Test elongate, compressed, consisting of a central, elongated body, with slightly projecting, apertural branches on either border, irregularly alternating; wall composed of sand grains with many spicules; color light gray.

Length up to 15 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9102) from *Albatross* station D5670 in 1,181 fathoms (2,160 meters), Macassar Strait, bottom temperature 38.2° F. (3.4° C.). It also occurred at D5622, in 275 fathoms (503 meters), between Gillolo and Makyan Islands and at D5619 in 435 fathoms (796 meters), Molucca Passage. At this last station it was very abundant, so much so that it might almost be called a *Dendrophrya attenuata* bottom, as this made up the great mass of the washed material at this station.

*Dendrophyra attenuata.—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Stations. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11621<br>9102 | U.S.N.M. | ...... | D5670... | 1 19 00 S.; 118 43 00 E.... | 1,181 | 38.2 | gy. m....... | Few. |
| | | | D5619... | 0 35 00 N.; 127 14 40 E... | 435 | ....... | fne. gy. s., m. | Abundant. |
| | | | D5622... | Makyan Id. (NE.), N. 66° W. | 275 | ....... | gy. m....... | |

## Genus HALIPHYSEMA Bowerbank, 1862.

### HALIPHYSEMA CATENULATA Cushman.

Plate 18, figs. 5, 6.

*Haliphysema catenulata* Cushman, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 228, pl. 28, figs. 5, 6.

*Description.*—Test elongate, tapering, with numerous constrictions as though segmented; wall arenaceous, with many included fragments of sponge spicules and with a crown of elongated spicules about the aperture; basal end with a sort of expanded portion like a proloculum, also made up largely of broken spicules; aperture terminal, circular, surrounded by the crown of erect spicules.

Length about 10 mm.

*Type specimen.*—Cat. No. 8464, U.S.N.M., from *Albatross* station D5630, south of Patiente Strait, Dutch East Indies, 569 fathoms (1,081 meters). The species was very common at this station, but was not met with elsewhere in the dredgings.

The spicules throughout the test except at the apertural tip are broken fragments, but about the aperture there are elongate spicules not entire, but so placed that they rise up above the aperture like a crown.

*Haliphysema catenulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11634<br>8464 | U.S.N.M. | 10+ | D5630... | 9 56 30 S.; 128 05 00 E.... | 569 | ....... | co. s., m ..... | Common. |

## Genus JACULELLA H. B. Brady, 1879.

### JACULELLA ACUTA H. B. Brady.

Plate 3, fig. 7.

*Jaculella acuta* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 35, pl. 3, figs. 12, 13; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 225, pl. 22, figs. 14–18.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 70, figs. 90, 91 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 84, pl. 32, figs. 1–4.

Specimens of this species have been noted from five stations in the material examined: D5212, east of Masbate Island, 108 fathoms (198 meters), bottom temperature 59.9° F. (15.5° C.); D5236, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5454, Jolo Sea, 153 fathoms (279 meters), and D5467, east coast of Luzon, 480 fathoms (878 meters); bottom temperatures in the last two cases not recorded.

The specimens were typical, and at station D5212 were fairly numerous.

*Jaculella acuta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Stations. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5454... | 13 12 00 N.; 123 50 30 E... | 153 | ...... | .............. | Rare. |
| [illegible] | U.S.N.M. | ...... | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | ...... | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ...... | gy. m ...... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5212... | 12 04 15 N.; 124 04 36 E... | 108 | 59.9 | gy. s., m.... | Few. |

### JACULELLA OBTUSA H. B. Brady.

Plate 3, fig. 6.

*Jaculella obtusa* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 256, pl. 22, figs. 19–22.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 71, fig. 92 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 85, pl. 32, fig. 5.

This species was seen in material from three stations: D5236, off the east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5291, China Sea, vicinity southern Luzon, 173 fathoms (316 meters), bottom temperature 51.5° F. (10.8° C.); and D5445, east coast of Luzon, 383 fathoms (699 meters), bottom temperature 44.3° F. (6.8° C.). The specimens from the last station were the most numerous and most nearly typical of any.

*Jaculella obtusa—material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Stations. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 3420<br>3419 | U.S.N.M. | ...... | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 3417 | U.S.N.M. | ...... | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s .... | Few. |
| 3418 | U.S.N.M. | ...... | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s.... | Few. |

## Genus SAGENINA Chapman, 1900.

### SAGENINA FRONDESCENS (H. B. Brady).

Plate 9, fig. 1; plate 14, fig. 1.

*Sagenella frondescens* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 41, pl. 5, fig. 1; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 278, pl. 28, figs. 14, 15.
*Sagenina frondescens* Chapman, Journ. Linn. Soc., vol. 28, 1900, p. 4, pl. 1, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 71, fig. 93 (in text).

Occurring as single specimens, or, at most, rarely, this species has been noted from three stations: D5152, Sulu Archipelago, Tawi Tawi Group, 24–34 fathoms (44–62 meters); D5192, off north Cebu Island, 32 fathoms (58 meters); D5217, between Burias and Luzon, 105 fathoms (193 meters), bottom temperature 63.1° F. (17.2° C.).

As previous records indicate this seems to be a species frequenting shallow, warm water. It is easily overlooked and is probably much more common in the region than the records indicate.

*Sagenina frondescens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Stations. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8230 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Rare. |
| 8231 | U.S.N.M. | 1 | D5192... | 11 9 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Rare. |
| 12885<br>13337 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |

### SAGENINA DIVARICANS Cushman.

Plate 8.

*Sagenina divaricans* Cushman, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 437, fig. 1.

*Description.*—Test attached, tubular, very slender, uniform in size, branching at nearly regular intervals, with a wide angle, sometimes anastomosing; walls of coralline mud, somewhat roughened; apertures at the ends of the tubes; color, white.

Diameter of the tubes, 0.05 to 0.1 mm.

*Type specimen.*—(Cat. No. 8229, U.S.N.M.) from *Albatross* station 5145, vicinity of Jolo, Jolo Archipelago, 23 fathoms (42 meters); attached to hardened coral sand on the interior of a bivalve shell. It also occurred at D5276, China Sea, vicinity of southern Luzon, 18 fathoms (33 meters), attached to *Textularia*. A single specimen attached to *Textularia rugosa* was found in material from station D5134, 25 fathoms (46 meters), Sulu Archipelago, near Basilan Island. The two other stations in the area at which it has occurred are D5148, Sulu Archipelago, vicinity of Siasi, 17 fathoms (31 meters), and D5239, Pujada Bay and vicinity, 171 fathoms (312 meters).

***Sagenina divaricans*—Material examined.**

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5145... | 6 4 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5239... | 6 49 8 N.; 126 15 12 E.. | 171 | ....... | sft. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s.... | Rare. |

## Subfamily AMMODISCINAE.

### Genus AMMOLAGENA Eimer and Fickert, 1899.

### AMMOLAGENA CLAVATA (Parker and Jones).

Plate 6, figs. 1–4; plate 10, figs. 3, 4.

*Trochammina irregularis*, var. *clavata* PARKER and JONES, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.

*Trochammina irregularis* (part) W. B. CARPENTER, PARKER, and JONES, Introd. Study Foram., 1862, p. 142, pl. 11, fig. 6.

*Webbina clavata* H. B. BRADY, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 349, pl. 41, figs. 12–16.

*Ammolagena clavata* EIMER and FICKERT, Zeitschr. Wiss. Zool., vol. 65, 1889, p. 673.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 68, figs. 86–89 (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 89, pl. 34, figs. 2–5; pl. 35, figs. 1–3.

*Webbinella clavata* RHUMBLER, Arch. Protistk., vol. 3, 1903, pt. 229, fig. 55 (in text).

Both microspheric and megalospheric forms of this species have been obtained in this material, the microspheric form having a smaller but much longer tube than the megalospheric form; also the megalospheric form is much more common. The attachment is usually to smooth surfaces or ones that are comparatively so. I have noted its occurrence on the following genera: *Rhabdammina*, *Ammodiscus*, *Reophax*, *Cyclammina*, *Haplophragmoides*, *Trochammina*, *Bulimina*, *Cristellaria*, *Pulvinulina*, and *Biloculina*. It also occurs on bits of shell and various foreign bodies.

There is an interesting specimen from D5236, Pacific Ocean, east coast of Mindanao, attached to a species of *Quinqueloculina*, which apparently represents the first chamber only of *A. clavata*. This has the appearance of *Webbinella hemisphaerica*, but at the edge is a very small definite aperture. As *A. clavata* is common at this station this may represent the young stage of this species which has not yet developed the tubular chamber.

*Ammolagena clavata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8206 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 13431 | U.S.N.M. | ...... | D5238... | 7 34 45 N.; 126 38 15 E.. | 380 | 43 | gn. m........ | |
| | | | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | Rare. |
| 14063 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m........ | Rare. |
| 13428 | U.S.N.M. | 1 | D5459... | 13 10 21 N.; 59 54 00 E.. | 201 | ....... | ............... | Rare. |
| 13426 | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| 13429 | U.S.N.M. | 3 | D5582... | 4 19 54 N.; 58 38 00 E.. | 890 | 38.3 | gy. m., fne. s. | Few. |
| 12788 | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 38 20 00 E.. | 260 | ....... | ............... | Rare. |
| 13427 | U.S.N.M. | ...... | D5637... | 3 33 20 S.; 48 00 00 E.. | 700 | ....... | gy. m........ | Rare. |
| 14004 | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m ....... | Rare. |
| 12789 | U.S.N.M. | ...... | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m ....... | Rare. |
| 14886 | U.S.N.M. | 6 | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy. m., glob.. | Few. |
| 13430<br>13432<br>13433<br>13434 | U.S.N.M. | 10 | [1]D5236... | ........................ | ...... | ....... | ............... | Common. |
| 12790<br>13435 | U.S.N.M. | 3 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | Few. |
| 12787 | U.S.N.M. | 1 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52.0 | fne. s........ | Rare. |

[1] See No. 1 above.

## Genus AMMODISCUS Reuss, 1861.

### AMMODISCUS INCERTUS (d'Orbigny).

Plate 5, figs. 1, 2.

*Operculina incerta* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 49, pl. 6, figs. 16, 17.

*Ammodiscus incertus* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 330, pl. 38, figs. 1-3.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 278, pl. 23, fig. 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 73, figs. 95, 96*a*, *b* (in text); Bull. 104, U. S. Nat. Mus., pt. 1, 1918, p. 95, pl. 39.

*Ammodiscus tenuis* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 51; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 332, pl. 38, figs. 4-6.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 279, pl. 23, fig. 1.

Specimens of this species were very numerous and were found at a large number of stations, especially in the southern portion of the area. Depths vary from 24-1,570 fathoms (44-2,871 meters) and bottom temperatures, were recorded, from 38.2° to 52.0° F. (3.4° C. to 11.1° C.). At several stations where a number of specimens were found a record was kept of the number of microspheric and megalospheric specimens, as follows:

| | Microspheric. | Megalospheric. | | Microspheric. | Megalospheric. |
|---|---|---|---|---|---|
| 14.............................. | 11 | 3 | 5.............................. | 5 | 0 |
| 6.............................. | 2 | 4 | 12.............................. | 10 | 2 |
| 7.............................. | 1 | 6 | 13.............................. | 1 | 12 |
| 3.............................. | 0 | 3 | 50.............................. | 9 | 41 |
| 3.............................. | 0 | 3 | 12.............................. | 0 | 12 |
| 4.............................. | 0 | 4 | 9.............................. | 3 | 6 |
| 3.............................. | 1 | 2 | 25.............................. | 0 | 25 |
| 30.............................. | 18 | 12 | | | |
| 3.............................. | 0 | 3 | 199 | 61 | 138 |

If record had been kept of other cases where a few megalospheric specimens were found and no microspheric ones, the preponderance of megalospheric specimens would be much greater.

*Ammodiscus incertus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ' '' ° ' '' | | ° *F.* | | |
| [illegible] | U.S.N.M. | 6 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Few. |
| [illegible]<br>[illegible]<br>[illegible] | U.S.N.M. | 10+<br>9<br>6 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Common. |
| [illegible] | U.S.N.M. | 3 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s. p.......... | Few. |
| | | | D5272... | 14 00 00 N.; 120 23 30 E... | 118 | 57.4 | m. sh., co. s.. | |
| [illegible] | U.S.N.M. | ...... | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Rare. |
| | | 1 | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s., sh., m.... | Rare. |
| [illegible] | U.S.N.M. | 7 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Few. |
| | | | D5385... | 13 24 50 N.; 123 08 70 E... | 327 | 62.4 | gy. m....... | |
| [illegible] | U.S.N.M. | 4 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 2 | D5429... | 9 41 30 N.; 118 50 22 E... | 766 | ....... | gn. m....... | Rare. |
| | | | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | |
| [illegible] | U.S.N.M. | 2 | D5439... | 15 58 15 N.; 119 40 20 E... | 940 | 36.7 | gn. m....... | Rare. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | |
| [illegible] | U.S.N.M. | ...... | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m....... | |
| | | 6 | D5447... | 13 28 00 N.; 123 46 18 E... | 310 | 45.3 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E... | 300 | ....... | ............. | Rare. |
| [illegible] | U.S.N.M. | 3 | D5460... | 13 32 30 N.; 123 58 06 E... | 565 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m. (m.b.) | Rare. |
| | | | D5567... | 5 48 00 N.; 120 33 45 E... | 268 | 52.0 | fne. s......... | |
| [illegible] | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E.. | ....... | ....... | ............. | Rare. |
| [illegible] | U.S.N.M. | 6 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 10 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m .... | Common. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | |
| [illegible] | U.S.N.M. | 3 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,500 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |
| | | | D5656... | 3 17 40 S.; 120 36 45 E... | 484 | 41.2 | gy. m....... | |
| | | | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5667... | 2 56 00 S.; 118 47 30 E... | 367 | 41.7 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 4 | H4897... | 7 46 00 N.; 122 00 00 E... | 1,570 | ....... | gy. m., glob. | Few. |

### AMMODISCUS INCERTUS d'Orbigny, var. DISCOIDEUS Cushman.

Plate 5, fig. 3.

*Ammodiscus incertus*, var. *discoideus* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 652.

*Description.*—Variety differing from the typical in having the sides rapidly increasing in diameter, the width of the coils in side view very much less than in the typical, and the border in apertural view very broadly rounded, the periphery oftentimes nearly straight in the central portion.

Diameter of microspheric specimens up to 2.5 mm.

*Distribution.*—Type-specimen (U.S.N.M. No. 9103) from *Albatross* station D5658 in 510 fathoms (933 meters), Gulf of Boni, bottom temperature 41.2° F. (5.1° C.). It also occurred at D5272, China Sea, vicinity southern Luzon, 118 fathoms (203 meters), bottom temperature, 57.4° F. (14.1° C.); D5582, in 890 fathoms (1,628 meters), off Darvel Bay, Borneo, bottom temperature 38.3° F. (3.5° C.); D5585, Sibuko Bay, Borneo, 476 fathoms (871 meters), bottom temperature 41.1° F. (5° C.); D5591, in 260 fathoms (480 meters), Sibuko Bay, Borneo; D5651, in 700 fathoms (1,280 meters); and D5656, in 484 fathoms (885 meters), both in the Gulf of Boni.

The microspheric form of the variety is only about half the size of the microspheric form of the typical.

*Ammodiscus incertus*, var. *discoideus*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13935 | U.S.N.M. | 6 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Few. |
| 13936 | U.S.N.M. | 5 | D5582... | 4 19 54 N.; 118 58 38 E.. | 890 | 38.3 | gy. m., fine. s. | Few. |
| 13178 | U.S.N.M. | ...... | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |
| 13937 | U.S.N.M. | 2 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | .............. | Rare. |
| 13938 | U.S.N.M. | 10 | D5651... | 4 43 50 S.; 121 23 24 E.. | 700 | 40.1 | gn. m....... | Common. |
| 13939 | U.S.N.M. | 2 | D5656... | 3 17 40 S.; 120 36 45 E.. | 484 | 41.2 | gy. m....... | Few. |
| 9103 | U.S.N.M. | 1 | D5658... | 3 32 40 S.; 120 31 30 E.. | 510 | 41.2 | gy. m....... | Few. |

#### AMMODISCUS EXSERTUS Cushman.

Plate 5, fig. 4.

*Ammodiscus exsertus* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 75, figs. 97*a*, *b* (in text).

The only station at which this species occurred is D5637, Bouro Island (south) and vicinity, 700 fathoms (1,280 meters).

*Ammodiscus exsertus*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15343 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m ...... | Rare. |

# Family LITUOLIDAE.

## Subfamily ASCHEMONELLINAE.

### Genus ASCHEMONELLA H. B. Brady, 1879.

#### ASCHEMONELLA CATENATA (Norman).

Plate 6, fig. 5.

*Astrorhiza catenata* NORMAN, Proc. Roy. Soc. London, vol. 25, 1876, p. 213.

*Aschemonella catenata* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 42, pl. 14, figs. 12, 13; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 271, pl. 27, figs. 1–11; pl. 27A, figs. 1–3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 81, figs. 111–113 (in text).

A single specimen here figured occurred at D5637, Bouro Island (south) and vicinity, 700 fathoms (1,280 meters). It was also found at the neighboring station D5639, Molucca Sea, 1,560 fathoms (2,853 meters).

*Aschemonella catenata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m. ...... | Rare. |

## Subfamily REOPHACINAE.

### Genus REOPHAX Montfort, 1808.

### REOPHAX SCORPIURUS Montfort.

Plate 6, fig. 6.

"*Orthoceras*"? SOLDANI, Testaceographica, vol. 1, 1795, p. 239, pl. 162, fig. *k*.

*Reophax scorpiurus* MONTFORT, Conch. Syst., vol. 1, 1808, p. 330, 83me genre.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 291, pl. 30, figs. 12-17.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 83, figs. 114-116 (in text).

Many specimens have been found in the material examined which may, in a general way, be referred to this species, but well defined material is not abundant. Specimens referred to this species have occurred in comparatively shallow water in various parts of the region from 24 to 510 fathoms (44 to 933 meters), with bottom temperatures, where recorded, 41.2° F. (5.1° C.), 44.3° F. (6.8° C.), 52.3° F. (10.1° C.), and 75.7° F. (24.2° C.). As a rule it seems to occur in warm and shallow water.

*Reophax scorpiurus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | ...... | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s., sh. | Frequent. |
| | | | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. m., s., sh. | Few. |
| | | | D5133... | Id. off Panabutan Pt. N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Abundant. |
| [illegible] | U.S.N.M. | ...... | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Rare. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh .... | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fine s ........ | Abundant. |
| [illegible] | U.S.N.M. | ...... | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s. ...... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s ........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Rare. |
| [illegible] | U.S.N.M. | ...... | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s. br. Co. .... | Few. |
| [illegible] | U.S.N.M. | ...... | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s ........ | Rare. |
| | | | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Few. |
| | | | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh.... | Frequent. |
| [illegible] | U.S.N.M. | ...... | D5658... | 3 32 40 S.; 120 31 30 E.. | 510 | 41.2 | gy. m. ...... | Rare. |

### REOPHAX PILULIFER H. B. Brady.

Plate 12, fig. 1.

*Reophax pilulifera* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 292, pl. 30, figs. 18-20.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 85, figs. 117, 118 (in text).

This species has occurred at 13 stations in the region, usually but few specimens occurring at any station.

The stations are all in less than 1,000 fathoms (1,829 meters), excepting one, D5637, in 1,560 fathoms (2,853 meters), while from the *Challenger* records Brady makes the statement that it "appears to be peculiar to deep water," most of the records from that material being of considerable depths.

The following localities are represented by the specimens: Sulu Sea, off southern Panay; China Sea, off Luzon; east coast of Luzon; between Siquijor and Bohol Islands; Sibuko Bay, Borneo; and between Gillolo and Makyan Islands.

After an examination of material from one of the original stations in the *Porcupine* dredgings it seems probable that many of the records for this species represent other species. The Philippine specimens are smaller than those of the *Porcupine* material and are not typical.

*Reophax pilulifer—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Rare. |
| 11606 | U.S.N.M. | ...... | D5127... | 10 02 45 N.; 121 48 15 E.. | 968 | 50.1 | gy. m., glob. | Rare. |
| 15345 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 12914 | U.S.N.M. | ...... | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| 12905 | U.S.N.M. | ...... | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m........ | Rare. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m.(m.b.) | Frequent. |
| 12916 | U.S.N.M. | ...... | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m........... | Few. |
| 14029 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob.. | Rare. |
| 12920 | U.S.N.M. | ...... | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Few. |
| 12918 | U.S.N.M. | ...... | D5622... | Makyan Id. (NE.) N. 66° W | 275 | ....... | gy. m........ | Rare. |
| 12919 | U.S.N.M. | ...... | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m........ | Rare. |
| 12917 | U.S.N.M. | ...... | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | .............. | Rare. |

### REOPHAX DISTANS H. B. Brady.

Plate 12, fig. 2.

*Reophax distans* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 296, pl. 31, figs. 18-22.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 85, fig. 119 (in text).

A single specimen was found in material from D5621, between Gillolo and Makyan Islands, 298 fathoms (545 meters). At D5639, Molucca Sea, 1,560 fathoms (2,853 meters), it was abundant but most of the specimens were broken.

Owing to the weakness of the stolonlike connections between the chambers it is rare for more than two or three chambers to be found connected in dredged material. In the North Pacific material specimens were found which appeared to have the proloculum intact but the *Challenger* material showed none with the proloculum present. Single chambers with the stolonlike tubes are the most common condition.

*Reophax distans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12949 | U.S.N.M. | ...... | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. and bk. s. | Rare. |
| 12948 | U.S.N.M. | ...... | D5639... | 3 54 50 S.; 123 27 30 E.. | 1,560 | ....... | gy. m........ | Few. |

### REOPHAX BACILLARIS H. B. Brady.

Plate 12, fig. 3.

*Reophax bacillaris* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 293, pl. 30, figs. 23, 24.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 86, fig. 120 (in text).

Specimens here referred to this species have been found at but four stations in the region, at one of which the specimens were in some numbers. The data for these stations show that its occurrence agrees with the rest of the Pacific records as to its being found at a considerable depth. The stations were: D5178, off Romblon, 73 fathoms (133 meters); D5460, east coast Luzon, 565 fathoms (1,074 meters); D5639, Molucca Sea, 1,560 fathoms (2,853 meters), bottom temperatures not given; and D5668, Macassar Strait, 901 fathoms (1,648 meters), bottom temperature 38.2° F. (3.4° C.).

An examination of *Valorous* material and other North Atlantic specimens has seemed to show that the typical *R. bacillaris* has a very definite distribution in the North Atlantic; also the size, form, and number of chambers, color, and in general the whole character of the species is very definite. The Philippine specimens are not typical, and it is probable that they do not represent this species. The discussion of the species is given in Bulletin 104, part 2, page 18.

*Reophax bacillaris—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 347 | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| 24 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 73 | ....... | fne. s........ | Rare. |
| 345 | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m........ | Rare. |
| 366 | U.S.N.M. | 8 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m........ | Common. |

### REOPHAX DENTALINIFORMIS H. B. Brady.

Plate 12, fig. 4.

*Reophax dentaliniformis* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 293, pl. 30, figs. 21, 22.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 87, fig. 121 (in text).

Specimens from this region are not quite typical, having as a rule the chambers shorter and more rotund than in the type, but there is some variation. Most of the stations are in more than 250 fathoms (457 meters) and it is most frequent and best developed in material from those stations which have the greater depth and the lower temperatures.

Hitherto the records for this species have been almost exclusively from deep waters, but more than half of these noted here are less than 500 fathoms (914 meters).

The localities for this species include China Sea off Luzon; between Negros and Siquijor; Sibuko Bay, Borneo; Gulf of Tomini, Celebes; north of Celebes; and off Bouro Island.

*Reophax dentaliniformis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14028 | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Rare. |
| 12941 | U.S.N.M. | 3 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Few. |
| 12989 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Rare. |
| 12937 | U.S.N.M. | 1 | D5538... | 9 08 15 N., 123 28 20 E.. | 256 | 53.3 | gn. m., s..... | Rare. |
| 12943 | U.S.N.M. | 1 | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gy. m....... | Rare. |
| 12936 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Rare. |
| 12944 | U.S.N.M. | 6 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m........ | Frequent. |
| 12938 | U.S.N.M. | 1 | D5587... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |
| 12942 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Rare. |
| 12940 | U.S.N.M. | 3 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Few. |
| 14922 | U.S.N.M. | 1 | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy. m., glob.. | Rare. |

### REOPHAX NODULOSUS H. B. Brady.

Plate 12, fig. 5; plate 10, figs. 1, 2.

*Reophax nodulosus* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 52, pl. 4, figs. 7, 8; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 294, pl. 31, figs. 1–9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 87, fig. 122 (in text).

This species has occurred at several stations, usually in great numbers with sand, and showing the same range of variation as in the figures given by Brady in the *Challenger* Report. The specimens are large as a rule, and are in comparatively deep and cold water, as might be expected from the conditions of its occurrence elsewhere.

It is interesting to note, however, that at the shallowest station of this lot, D5589, in 260 fathoms (480 meters), it was very abundant and very variable, showing almost completely the various forms figured by Brady in the *Challenger* Report. At D5236 it occurred abundantly in 494 fathoms (903 meters).

*Reophax nodulosus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12808 | U.S.N.M. | ...... | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m....... | Rare. |
| 12912<br>12913 | U.S.N.M.<br>U.S.N.M. | ...... | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gy. m....... | Few. |
| 9225<br>12905<br>12906 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 12907 | U.S.N.M. | ...... | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Few. |
| 12911 | U.S.N.M. | ...... | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Few. |
| 12909 | U.S.N.M. | ...... | D5589... | 4 12 10 N.; 118 38 08 E.. | 200 | 45.7 | fne. gy. s.... | Few. |
| 11733 | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gy. m....... | Rare. |

### REOPHAX NODULOSUS H. B. Brady, var. HORMOSINOIDES, new variety.

*Description.*—Test large and coarse, chambers broad, slightly longer than the breadth, rounded, pyriform, the widest portion being about one-fourth of the way between the base and the aperture; proloculum rounded and broad, aperture large at the end of the broadly truncate chamber; color grayish-brown.

Length up to 10 mm. or more.

*Type specimen.*—(Cat. No. 13240, U.S.N.M.) from *Albatross* station D5650, Gulf of Boni, in 540 fathoms (988 meters). At this station it is common, but the typical form of this species does not appear.

It also occurred at D5639, Molucca Sea, in 1,560 fathoms (2,853 meters).

This variety is similar to the specimens figured by Brady.[1]

*Reophax nodulosus, var. hormosinoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12910 | U.S.N.M. | 7 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m....... | Common. |
| 11612<br>13240 | U.S.N.M. | 8 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Common. |

### REOPHAX GUTTIFER H. B. Brady.

Plate 12, fig. 6.

*Reophax guttifera* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 49; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 295, pl. 31, figs. 10–15.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 88, fig. 123 (in text).

Apparently from the material examined the species is rare in the region. Specimens have occurred at H4897, Sulu Sea, off western

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[1] Challenger Report, pl. 31, figs. 1 and 5.

Mindanao, 1,570 fathoms (2,871 meters), no bottom temperature given; and D5637, vicinity Bouro Island, 700 fathoms (1,280 meters), no bottom temperature given.

*Reophax guttifer—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11609 | U.S.N.M. | ...... | H4897... | 7 43 45 N.; 122 08 45 E.. | 1,570 | ....... | gy. m., glob. | Rare. |
| 12061 | U.S.N.M. | ...... | D5637... | 8 53 20 S.; 126 46 00 E.. | 700 | ....... | gy. m....... | Common. |

### REOPHAX ADUNCUS H. B. Brady.

Plate 19, fig. 3.

*Reophax adunca* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 296, pl. 31, figs. 23–26.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 89, fig. 125 (in text).

In many ways this is an uncertain species to determine. Specimens from four stations may be referred to it: D5190, Tanon Strait, east coast of Negros Island, 295 fathoms (540 meters), bottom temperature 63° F. (17.2° C.); D5478, between Samar and Leyte, 57 fathoms (104 meters); D5481, the neighboring station, 61 fathoms (111 meters); and D5538, between Negros and Siquijor, 256 fathoms (468 meters), bottom temperature 53.3° F. (11.8° C.).

*Reophax aduncus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12052 | U.S.N.M. | ...... | D5190... | 10 08 15 N.; 123 16 45 E.. | 295 | 63 | gn. m....... | Rare. |
| 12697 | U.S.N.M. | ...... | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Rare. |
| 14080 | U.S.N.M. | 2 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh........... | Rare. |
| 15346 | U.S.N.M. | 9 | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ....... | s., sh., g...... | Common. |

### REOPHAX CYLINDRICUS H. B. Brady.

Plate 13, fig. 1.

*Reophax cylindrica* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 299, pl. 32, figs. 7–9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 91, figs. 129–131 (in text).

At one station, D5276, China Sea, off southern Luzon, 18 fathoms (33 meters), specimens were found in considerable numbers which are apparently this species. They are slightly more constricted than shown in Brady's figures, but in all other respects are the same. The occurrence of this species, especially in such shallow water, at a low latitude, is remarkable, as the other records are for depths of more than 1,500 fathoms (2,743 meters).

*Reophax cylindricus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible]<br>[illegible] | U.S.N.M. | 8 | D5276... | 12 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s.... | Common. |

### REOPHAX PSEUDOBACILLARIS Cushman.

*Reophax pseudobacillaris* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 438, figs. 2, 3.

*Description.*—Test elongate, arcuate, composed of a linear series of chambers; chambers shorter than broad in surface view, except the one last-formed, which appears nearly spherical, numerous, 16 to 20 or more; wall arenaceous, fairly coarse for the size of the test, slightly rough on the exterior; aperture small, in the middle of the terminal face of the chamber; color, dark reddish-brown.

Length up to 2 mm.

Specimens of this species have occurred at two stations; common at D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), 41.2° F. (5.1° C.), and rarely at D5613, Gulf of Tomini, off Celebes, 752 fathoms (1,375 meters), bottom temperature not given.

This species, while it has somewhat the appearance of *R. bacillaris* H. B. Brady, is much smaller, more arcuate, and has a dark reddish-brown color.

*Reophax pseudobacillaris—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8229<br>12897<br>12898 | U.S.N.M. | 4 | D5236... | 8 30 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Common. |
| 12900 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m...... | Rare. |

### REOPHAX FINDENS (Parker).

Plate 13, fig. 4.

*Lituola findens* PARKER, (in Dawson's paper) Can. Nat., vol. 5, 1870, p. 177, p. 180, fig. 1.—SIDDALL, Proc. Chester Soc. Nat. Sci., pt. 2, 1878, p. 47.

*Reophax findens* SIDDALL, Cat. British Rec. Foram., 1879, p. 4; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 299, pl. 32, figs. 10, 11.

One specimen, which was typical in every way, was found in the Philippine material. Unfortunately the station number on the label in the bottle had become so obliterated that it was impossible to read it. Therefore it can only be recorded as occuring in the region. The figure of this specimen is given.

*Reophax findens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11608 | .......... | 1 | .......... | .................................... | ...... | ...... | .............. | Rare. |

### REOPHAX SPICULOTESTUS Cushman.

Plate 13, fig. 2; plate 11, fig. 1.

*Reophax spiculotestus* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 438, fig. 4.

*Description.*—Test of medium size, composed of a linear series of elongate chambers, oval, in a straight or more often slightly curved line, contracted at the ends of each chamber, increasing rapidly in size toward the apertural end; perfect adult specimens with six or more chambers; wall thin, composed largely of siliceous sponge spicules, for the most part laid lengthwise of the test and firmly cemented; some sand grains present, usually neatly cemented; aperture fairly large; color, grayish.

Length up to 2 mm.

This species occurred at four stations in the region: D5210, off western Samar, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5410, between Cebu and Leyte Island, 385 fathoms (704 meters), no bottom temperature given; and D5654, Gulf of Boni, 805 fathoms (1,459 meters), bottom temperature 38.3° F. (3.4° C.).

This differs much in form and size from *R. spiculifer* H. B. Brady, as well as in the very different appearance of the test. Occurring as it does in company with an abundance of arenaceous species, it shows its selective power in the composition of its test.

*Reophax spiculotestus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15348 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 52.8 | gy. s., m.... | Rare. |
| 12907<br>12901<br>[illegible] | U.S.N.M. | ...... | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Common. |
| 12904 | U.S.N.M. | ...... | D5654... | 3 42 00 S.; 120 45 50 E.... | 805 | 38.3 | co. s........ | Few. |
| [illegible] | U.S.N.M. | ...... | D5410 .. | 10 28 45 N.; 124 05 30 E.... | 385 | ....... | gn. m....... | Few. |

### REOPHAX HORRIDUS Cushman.

Plate 13, fig. 3; plate 18, figs. 3, 4.

*Reophax horrida* CUSHMAN, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 229, pl. 28, figs. 3, 4.

*Description.*—Test elongate, of several chambers, with a nearly straight axis, chambers gradually increasing in size; wall arenaceous, with an abundance of included sponge spicules so arranged as to give a bristly appearance to the exterior of the test; aperture terminal, with a well-developed neck.

Length about 3 mm.

This species occurred at D5582, vicinity of Darvel Bay, Borneo, 890 fathoms (1,628 meters), bottom temperature 38.3° F., (3.4° C.), and D5630, south of Patiente Strait, 569 fathoms (1,081 meters).

This species differs from others described in the character of the wall, the great number of included spicules bristling in all directions giving a spiny appearance to the wall.

*Reophax horridus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8657 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E.... | 890 | 38.3 | gy. m., fne.s. | Rare. |
| 11859 | U.S.N.M. | 3 | D5630... | 0 56 20 S.; 128 06 00 E.... | 569 | ....... | co. s., m.... | Few. |

### REOPHAX AGGLUTINATUS Cushman.

Plate 14, figs. 2*a*, *b*.

*Reophax agglutinatus* CUSHMAN, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 637, pl. 79, fig. 6.

*Description.*—Test large and stout, composed of several chambers, nearly globular or slightly pyriform; wall composed almost entirely of agglutinated foraminiferal tests of *Globigerina* and *Pulvinulina*, held together by a light grayish cement; aperture with a slightly protuberant neck.

Length about 6 mm.

This species was described from *Albatross* station D5377, in 400 fathoms (732 meters), off Marinduque Island.

This is a large species and peculiar in its agglutinated test, made up almost entirely of other foraminiferal tests. In this respect it resembles *R. bilocularis* Flint, but is a typical uniserial *Reophax*.

It has also occurred at the following stations: D5201, Sogod Bay, southern Leyte, 554 fathoms (1,012 meters); D5259, off northwestern Panay, 312 fathoms (571 meters); and D5582, Darvel Bay, Borneo, 890 fathoms (1,628 meters).

*Reophax agglutinatus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15347 | U.S.N.M. | 7 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Common. |
| 12946 | U.S.N.M. | ...... | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 8512 | U.S.N.M. | ...... | D5377... | 13 26 00 N.; 122 19 00 E... | 400 | 49.6 | sft. gn. m... | Rare. |
| 8467 | U.S.N.M. | ...... | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |

### REOPHAX BILOCULARIS Flint.

Plate 12, fig. 7.

*Reophax bilocularis* Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 273, pl. 17, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 90, figs. 127 *a*, *b* (in text).

This species is very common in certain stations throughout the region. These stations range in depth from 208 to 976 fathoms (381 to 1,785 meters). A single specimen from D5342, Malampaya Sound, Palawan Island, in 14 to 25 fathoms (25 to 46 meters), is from the only shallow water station in which this species was found. The bottom temperature of these stations ranged from 41.1° to 53.9° F. (5° C. to 12.1° C.). The specimens from this region are more like the figures given by Flint than those which I have figured.[6]

*Reophax bilocularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14023 | U.S.N.M. | 2 | D5198... | 9 40 50 N.; 123 39 45 E... | 230 | 53.9 | gn. m...... | Few. |
| 14024 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ...... | gy. m., s... | Rare. |
| 12934 | U.S.N.M. | ...... | D5301... | 20 37 00 N.; 115 53 00 E... | 208 | 50.5 | gy. m., s.... | Few. |
| 14025 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E... | 14–25 | ...... | gy. m...... | Rare. |
| 14026 | U.S.N.M. | 4 | D5424... | 0 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s........ | Few. |
| 12933 | U.S.N.M. | ...... | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ...... | gn. m. (net). | Rare. |
| 12922 | U.S.N.M. | ...... | D5495... | 9 06 30 N.; 126 00 20 E... | 976 | 52.3 | gy. m...... | |
| 12929 | U.S.N.M. | ...... | D5523... | 8 48 44 N.; 123 27 35 E... | ...... | ...... | ...... | Frequent. |
| 12963 | U.S.N.M. | ...... | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m...... | Few. |
| 14027 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m...... | Few. |
| 12930 | U.S.N.M. | ...... | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s... | Few. |
| 12931<br>12932 | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m...... | Few. |

## Genus HORMOSINA H. B. Brady, 1879.

### HORMOSINA GLOBULIFERA H. B. Brady.

Plate 13, fig. 5.

*Hormosina globulifera* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 60, pl. 4, figs. 4, 5; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 326, pl. 39, figs. 1–6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 93, figs. 136 *a*, *b*, 137 (in text).

Specimens of this species have occurred at a large number of stations in the region. These stations are either off the east coast of

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[6] Bull. 71, fig. 127.

Luzon or in the region south of the Equator, north of Celebes. These range in depth from 260 to 901 fathoms (475 to 1,648 meters), most of the stations, however, being over 500 fathoms (914 meters). The bottom temperatures of these stations range from 38.2° to 56.4° F. (3.4° C. to 13.5° C.), but are given in a very few of those stations at which the species occurs.

*Hormosina globulifera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | ...... | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E.. | 300 | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | 2 | D5460... | 13 22 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m.(m.b.) | Rare. |
| | ....... | ...... | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m.(m.b.) | Few. |
| [illegible] | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gy. m....... | Rare. |
| | ....... | ...... | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne.gy.s.gy.m. | Few. |
| [illegible] | U.S.N.M. | ...... | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | ...... | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m ....... | Few. |
| [illegible] | U.S.N.M. | ...... | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Abundant. |
| [illegible] | U.S.N.M. | ...... | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E.. | 805 | 38.3 | ............... | Rare. |
| [illegible] | U.S.N.M. | 8 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m........ | Common. |

## HORMOSINA OVICULA H. B. Brady.

Plate 13, fig. 6.

*Hormosina ovicula* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 61 pl. 4, fig. 6; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 327, pl. 39, fig. 73.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 95, figs. 138*a*, *b* (in text).

Single specimens which may be referable to this species occurred at two stations, D5348, Palawan Passage, 375 fathoms (686 meters), bottom temperature 56.4° F. (13.5° C.), and D5589, Sibuko Bay, Borneo, 260 fathoms (475 meters), bottom temperature 45.7° F. (7.6° C.). These are the only records for this species in the region.

*Hormosina ovicula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5589... | 14 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne.gy.s.gy.m. | Rare. |

## HORMOSINA NORMANII H. B. Brady.

Plate 13, fig. 7.

*Hormosina normanii* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 52; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 329, pl. 39, figs. 19–23.—Cushman, Bull. 71, U. S. Nat. Mus., 1910, pt. 1, p. 95, fig. 139 (in text).

Specimens of this species which seem to be typical were found in some numbers at D5668, Macassar Strait, 901 fathoms (1,648 meters), 38.°2 F. (3.4° C.). This is the only station at which it occurred in the region.

*Hormosina normanii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13093 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E .. | 901 | 38.2 | gy. m........ | Rare. |

### HORMOSINA OVALIFORMIS Cushman.

Plate 9, figs. 2, 3; plate 18, figs. 9, 10.

*Hormosina ovaliformis* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 43 figs. 5, 6 (in text).

*Hormosina monile* CUSHMAN (not *H. monile* H. B. Brady), Proc. U. S. Nat. Mus vol. 42, 1912, p. 229, pl. 28, figs. 9, 10.

*Description.*—Test composed of a straight or more often slightl arcuate series of chambers closely joined to one another, chamber evenly tapering at either end, or slightly oval; wall of fine sand and reddish-brown cement, slightly roughened on the exterior, interio smooth; aperture small, rounded, at the end of the chamber, withou a definite neck; color dark brick-red.

Length up to 3.5 mm.

*Type specimen.*—Cat. No. 8221, U.S.N.M., from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, in 494 fathom (903 meters), bottom temperature 41.2°F. (5.1°C.).

It has occurred elsewhere in the region at the following station D5539, between Negros and Siquijor, depth and bottom temperatur not recorded, D5622, Makyan Island, 275 fathoms (503 meters and D5656, Gulf of Boni, 484 fathoms (885 meters), bottom temperature 41.2° F. (5.1° C.).

*Hormosina ovaliformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 8221 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Few. |
| 8468 | U.S.N.M. | 1 | D5539... | 9 03 20 N.; 123 24 25 E.... | ...... | ....... | ............. | Few. |
| 14034 | U.S.N.M. | 1 | D5622... | Makyan Id. (NE), N. 66° W | 275 | ....... | gy. m....... | Rare. |
| 14035 | U,S.N.M. | 1 | D5656... | 3 17 40 S.; 120 36 45 E.... | 484 | 41.2 | gy. m....... | Rare. |

### HORMOSINA ELONGATA Cushman.

*Hormosina elongata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 439, fig 7 *a,b*.

*Description.*—Test elongate, nearly straight, composed of a serie of elongate chambers; largest diameter near the base of each chamber thence gradually narrowing toward the apertural end; wall rather thick, composed of fine material with much cement, smoothly finished; aperture rather small, elliptical; color reddish-brown, lighter about the aperture.

Length 5 to 10 mm.

Several specimens of this species were found at D5236, off the east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5°.1 C.).

This species is much more elongate in regard to its entirety and in its individual chambers than other species of the genus. Its nearest related species seems to be *Hormosina carpenteri* H. B. Brady, but the curvature of the test and the shape of the chambers is very different.

*Hormosina elongata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 2 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.... | 494 | ° F.<br>41.2 | fne. gy. s.... | Rare. |

## HORMOSINA CARPENTERI H. B. Brady.

Plate 15, fig. 5.

"*Moniliform Lituola*" CARPENTER, The Microscope, ed. 5, 1875, p. 531, fig. *f*.

*Hormosina carpenteri* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 51.—CARPENTER, The Microscope, ed. 6, 1881, p. 563, fig. *f*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 327, pl. 39, figs. 14–18.

*Description.*—Test elongate, composed of several chambers arranged in an irregular line, pyriform, base rounded, tapering toward the apertural end, increasing slightly in size toward the apertural end of the test; wall composed of fine arenaceous material, often made hispid by included sponge spicules.

Length up to 12.5 mm. or more.

*Distribution.*—The only material I have had of this species was rather characteristic, from *Albatross* D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.).

*Hormosina carpenteri—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 1349 | U.S.N.M. | 1 | D5259... | ° ′ ″ ° ′ ″<br>11 57 30 N.; 121 42 15 E... | 312 | ° F.<br>49.3 | gy. m., glob.. | Rare. |

### HAPLOPHRAGMOIDES EMACIATUM (H. B. Brady).

*Haplophragmium emaciatum* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 305, pl. 33, figs. 26–28.

*Haplophragmium compressum* Millett (not *Haplophragmium compressum* Goës), Journ. Roy. Micr. Soc., 1889, p. 359, pl. 5, fig. 8.

*Haplophragmoides emaciatum* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 102, figs. 150–152 (in text).

This species occurred in the material from but four stations. These were all in deep water in the Sulu Sea, in bottom material of Globigerina-ooze off Celebes, and Bouro Island. The stations are: D5127, Sulu Sea, vicinity southern Panay, 958 fathoms (1,752 meters), bottom temperature 50.1° F. (10° C.); H4897, Sulu Sea, off western Mindanao, 1,570 fathoms (2,871 meters), no bottom temperature given; D5601, Gulf of Tomini, Celebes, 765 fathoms (1,399 meters), bottom temperature not recorded; and D5637, Bouro Island, 700 fathoms (1,280 meters).

*Haplophragmoides emaciatum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13080 | U.S.N.M. | 1 | D5127... | 10 02 45 N.; 121 48 15 E.. | 958 | 50.1 | gy.m.,glob.. | Rare. |
| 13029 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s.,glob.,ptr. | Rare. |
| 14062 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy.m........ | Rare. |
| 8216<br>4755 | U.S.N.M. | ...... | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy.m.,glob.. | Few. |

### HAPLOPHRAGMOIDES SCITULUM (H. B. Brady).

*Haplophragmium scitulum* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 308, pl. 34, figs. 11–13.

*Haplophragmoides scitulum* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 103, figs. 153–155 (in text).

Typical specimens of this species were found in material from two stations: D5175, Sulu Sea, southeast of Cagayanes Islands, depth and bottom temperature not given; and D5467, east coast Luzon, 480 fathoms (878 meters), bottom temperature not given.

*Haplophragmoides scitulum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13066 | U.S.N.M. | 1 | D5175... | 9 21 00 N.; 121 37 45 E... | ...... | ....... | ............. | Rare. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy.m. (m. b.) | |

### HAPLOPHRAGMOIDES SUBGLOBOSUM (G. O. Sars).

Plate 15, figs. 1*a*, *b*.

*Lituola subglobosa* M. SARS, Forh. Vid. Selsk. Christiania, 1868 (1869), p. 250 (*nomen nudum*).—G. O. SARS, Forh. Vid. Selsk. Christiania, 1871, (1872), p. 253.

*Haplophragmium subglobosum* H. B. BRADY, Denkschr. kais. Akad. Wiss. Wien, vol. 43, 1881, p. 100.

*Haplophragmium latidorsatum* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 307, pl. 34, figs. 7, 8, 10, 14 (?) (not fig. 9), and subsequent authors (not *Nonionina latidorsata* Bornemann, 1855).

*Haplophragmoides subglobosum* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 105, figs. 162–164 (in text).

This is one of the commonest species of the genus in the region. Specimens are usually numerous at the stations where found and are typical, with slight variation in color and texture of the test according to the material of the bottom on which it occurred. Nearly all of the stations are in comparatively deep water. The depths vary from 80 to 1,560 fathoms (146 to 2,853 meters), nearly all of them being over 300 fathoms (549 meters). Bottom temperatures are recorded in but four of the many stations—44.0°, 44.3°, and 58.6° F. (6.4°, 6.8°, and 14.7° C.). These four stations were 310, 347, 383, and 80 fathoms (567, 635, 700, and 146 meters) respectively in depth. The localities include the following: East coast of Mindoro, China Sea off Luzon and off Formosa; east coast of Luzon; Sibuko Bay, Borneo; Patiente Strait; and Molucca Sea.

*Haplophragmoides subglobosum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12765 | U.S.N.M. | 10+ | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Common. |
| 12766 | U.S.N.M. | 2 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s......... | Rare. |
| 12869 | U.S.N.M. | 3 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Few. |
| | | | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m............ | Rare. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Rare. |
| | | | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m........ | Few. |
| 12767 | U.S.N.M. | 10+ | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m. (m.b.) | Frequent. |
| | | | D5468... | 13 35 39 N.; 123 40 28 E... | 569 | ....... | gn. m........ | Rare. |
| | | | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m........ | Common. |
| 14063 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gy. m., s.... | Rare. |
| 12868 | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | .............. | Rare. |
| 12877 | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m ..... | Few. |
| 12874 | U.S.N.M. | 6 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m....... | Frequent. |

### HAPLOPHRAGMOIDES RINGENS (H. B. Brady).

Plate 15, fig. 2.

*Trochammina ringens* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 57, pl. 5, figs. 12*a*, *b*; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 343, pl. 40, figs. 17, 18.

*Ammochilostoma ringens* EIMER and FICKERT, Zeitschr. wiss. Zool., vol. 65, 1889, p. 692.

*Haplophragmoides ringens* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 107, fig. 166 (in text).

At one station, D5613, off Celebes, 752 fathoms (1,375 meters), bottom temperature unrecorded, numerous typical and very fine specimens of this species occurred, but it was not found in material elsewhere in the region.

*Haplophragmoides ringens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13064 | U.S.N.M. | 8 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy.m....... | Frequent. |

### HAPLOPHRAGMOIDES GRANDIFORMIS Cushman.

Plate 11, fig. 2.

*Haplophragmoides grandiformis* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 440, fig. 11.

*Description.*—Test free, involute, planospiral; chambers low and broad, seven to nine in the last-formed coil, inflated; peripheral line of the test in side view considerably depressed at the sutures; wall composed of rather coarse sand grains with a considerable proportion of yellowish-brown cement, somewhat rough on the exterior; aperture an elongate, curved slit at the base of the apertural face of the chamber; color light brown.

Diameter about 3 mm.

*Distribution.*—Type specimen from *Albatross* station 5152, near the Tawi Tawi group, 34 fathoms (62 meters).

This is a large species somewhat resembling *H. canariensis*, but involute with broad low chambers.

It has occurred elsewhere in the region at D5277, China Sea, vicinity of southern Luzon, 80 fathoms (147 meters), and D5369, Molucca Sea, 1,560 fathoms (2,853 meters). Bottom temperatures were not recorded in any cases.

*Haplophragmoides grandiformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8217 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Rare. |
| 1406 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | ....... | ............... | Rare. |
| 14060 | U.S.N.M. | 1 | D5369... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy.m....... | Rare. |

### HAPLOPHRAGMOIDES SPHAERILOCULUM Cushman.

Plate 15, fig. 3.

*Haplophragmoides sphaeriloculum* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 652.

*Description.*—Test biconvex, composed of about three coils, chambers comparatively few, five in each coil, subspherical, sutures deeply depressed; wall composed of fine sand grains with a reddish-brown cement, the sutures and umbilical depression more or less filled with a light-colored fine amorphous material; aperture a narrow slit at the base of the chamber.

Diameter about 2 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9104) from *Albatross* station D5637, in Pitt Passage, in 700 fathoms (1,280 meters).

This species is marked by the very convex, inflated, almost spherical chambers, with a fine grained, yellowish-brown wall.

Sidebottom has recorded this species from the east coast of Australia, in 465 fathoms (846 meters).[7]

*Haplophragmoides sphaeriloculum—Material examined.*

|  | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible]<br>9104<br>15350 | U.S.N.M.<br>U.S.N.M.<br>U.S.N.M. | 5<br>1 | D5637... | ° ′ ″ ° ′ ″<br>3 53 20 S.; 126 48 00 E.. | 700 | ° F.<br>....... | gy.m....... | Few. |

## Genus CRIBROSTOMOIDES Cushman, 1910.

### CRIBROSTOMOIDES BRADYI Cushman.

Plate 17, figs. 1*a*, *b*.

*Haplophragmium latidorsatum* H. B. Brady (part) (not Bornemann), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 307, pl. 34, fig. 9.

*Cribrostomoides bradyi* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 108, figs. 167, *a*, *b* (in text).

This species occurs at numerous stations and in considerable numbers, especially in the region south of the Equator, where so many arenaceous forms occur. Apparently both microspheric and megalospheric forms of the species occur here; the smaller meglospheric specimens do not show the cribriform aperture as well as the larger microspheric specimens. Also in the development of a single specimen the aperture in the earlier chambers is simple and gradually becomes the cribriform structure of the adult. In these characters it agrees with what has already been noted in *Haplostiche dubia*. But all the stations at which the species occurred are in comparatively deep water, between 700 and 900 fathoms (1,280 and 1,646 meters). At three stations specimens were found in 298, 312, and 476 fathoms (545, 571, and 871 meters). These are the only four stations less than 700 fathoms. The bottom temperatures were given in but four cases—38.2°, 38.3°, 41.1°, and 49.3° F. (3.4° C., 3.5° C., 5° C., and 9.6° C.). This last was from a station with a depth of but 312 fathoms (571 meters).

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[7] Journ. Roy. Micr. Soc., 1918, p. 15, pl. 2, figs. 15, 16.

The localities represented are: Sibuko Bay, Borneo; north of Celebes; between Gillolo and Makyan Islands; off Bouro Island; Gulf of Boni; and Flores Sea.

*Cribrostomoides bradyi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12658 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| | | | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Few. |
| 12655 | U.S.N.M. | 2 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Few. |
| 12653 | U.S.N.M. | 4 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Frequent. |
| 12657 | U.S.N.M. | 10+ | | | | | | |
| 15351 | U.S.N.M. | 1 | D5621... | 0 15 00 S.; 127 24 35 E.. | 298 | ....... | gy. and bk. s. (m. b.). | Rare. |
| 12656 | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m ....... | Few. |
| | | | D5654... | 3 42 00 S.; 120 45 50 E.. | 805 | 38.3 | ............... | Abundant. |
| | | | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m..... . | Common. |

## Genus CYCLAMMINA H. B. Brady, 1876.

### CYCLAMMINA CANCELLATA H. B. Brady.

Plate 16, figs. 1*a*, *b*.

"Nautiloid *Lituola*" W. B. CARPENTER, The Microscope, ed. 5, 1875, p. 536, figs. 274*a–c* (in text).

*Cyclammina cancellata* H. B. BRADY (MS.) in Norman, Proc. Roy. Soc. London, vol. 25, 1876, p. 214; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 351, pl. 37, figs. 8-16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 110, figs. 168-170 (in text) (not fig. 171).

*Description.*—Test nautiloid, typically biconvex, but occasionally slightly more convex on one side than the other; chambers numerous, averaging about 13 chambers in the last-formed coil, ranging from 12 to 15; usually three full coils in the adult test; peripheral edge of test broadly rounded, approximately semicircular; sutures distinct but only slightly depressed, chambers little if at all inflated, curved anteriorly in a nearly even curve in side view; wall smooth and polished when perfect, when eroded, showing the perforate, cancellate appearance due to the exposure of the labyrinthic interior; aperture an elongate, curved slit at the base of the apertural face, supplemented by a clustered series of rounded pores occupying the central part of the apertural face, often becoming very numerous in large specimens; color reddish- or yellowish-brown, some of the individual chambers occasionally black.

Diameter up to 6.5 mm. in the microspheric form, averaging in the commoner megalospheric form 3 to 4 mm.

*Distribution.*—This species was found very abundantly at some stations: East coast of Mindanao; east coast of Luzon; China Sea; Jolo Sea; Molucca Passage; Patiente Strait; and Gulf of Boni. These stations range in depth from 208 to 940 fathoms (381 to 1,719 meters), the average being 560 fathoms (1,065 meters). Bottom temperatures range from 36.7° F. to 53° F. (2.6° C. to 11.7° C.), the average being 46.3° F. (7.8° C.)

This species may be characterized by the broadly rounded peripheral margin, the number of chambers averaging 13 to 15. The rotund tumid character of the test as a whole will distinguish it at once from any of the following. Both microspheric and megalospheric forms occur in this species and are similar except in size.

*Cyclammina cancellata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | | | | | | |
| [illegible] | U.S.N.M. | 10+ | | | | | | |
| [illegible] | U.S.N.M. | 3 | D5301... | 20 37 00 N.; 115 53 00 E.. | 208 | 50.5 | gy. m., s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m., co. s. | Few. |
| 14041 | U.S.N.M. | 6 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s ........ | Frequent. |
| 14037 | U.S.N.M. | 5 | D5425... | 9 37 45 N.; 121 11 00 E.. | 495 | 49.4 | gy. m., co. s. | Frequent. |
| 14036 | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Few |
| 12889 | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gn. m....... | Few. |
| 14042 | U.S.N.M. | 7 | D5468... | 13 35 39 N.; 123 40 28 E.. | 509 | ....... | gn. m. (m. b.). | Frequent. |
| 12868 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net).. | Few. |
| 14044 | U.S.N.M. | 6 | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m........... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5619... | 0 35 00 N.; 127 14 40 E.. | 435 | ....... | fne. gy. s., m. | Few. |
| 12870 | U.S.N.M. | 4 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 10 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m.... | Frequent. |
| 14043 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Few. |

## CYCLAMMINA COMPRESSA Cushman.

Plate 16, figs. 2*a*, *b*.

*Cyclammina cancellata* (part) CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 111, fig. 171 (not figs. 168–170) (in text).

*Cyclammina compressa* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 653.

*Description.*—Test nautiloid, biconvex, compressed peripheral margin subacute, umbilicus often notably excavated; chambers numerous, 14 to 16 in the last-formed coil, usually 15; sutures subangular in the middle in side view, clearly depressed, surface smooth when perfect; aperture and color as in *C. cancellata*.

Diameter up to 3.5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9105) from *Albatross* station D5470, in 560 fathoms (1,065 meters) off the east coast of Luzon. It was noted at numerous stations in the same locality, one station off the west coast of Luzon; Darvel Bay and Sibuko Bay, Borneo; north of Celebes; Patiente Strait; Gulf of Boni, Flores and Macassar Strait. These stations range in depth from 208 to 1,092 fathoms (381 to 1,998 meters), the average depth being 601 fathoms (1,099 meters). Bottom temperatures range from 36.3° to 50.5° F. (2.3° C. to 10.2° C.) with the average 40.3° F. (4.6° C.).

This species seems to be in colder and deeper water than the preceding, from which it may be distinguished by its compressed form, larger number of chambers, depressed umbilical area, and subangular, somewhat depressed sutures.

*Cyclammina compressa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14049 | U.S.N.M. | 10 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Common. |
| 14050 | U.S.N.M. | 2 | D5439... | 15 58 15 N.; 119 40 20 E... | 940 | 36.7 | gn. m....... | Few. |
| 13250 | U.S.N.M. | 4 | D5460... | 13 32 30 N.; 123 58 06 E... | 565 | ....... | gy. m........ | Few. |
| 13244 | U.S.N.M. | 1 | D5466... | 13 35 39 N.; 123 40 28 E... | 569 | ....... | gn. m. (m. b.) | Common. |
| 12876 | U.S N.M. | 10+ | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gn. m. (m. b.) | Common. |
| 13246 | U.S.N.M. | 6 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. (m. b.) | Common. |
| 13245 | U.S.N.M. | 10+ | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............ | Frequent. |
| 14051 | U.S.N.M. | 5 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Few. |
| 14052 | U.S.N.M. | 7 | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | ............... | Frequent. |
| 13252 | U.S.N.M. | 2 | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m....... | Few. |
| 13249 | U.S.N.M. | 3 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Few. |
| 13248 | U.S.N.M. | 2 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. | Few. |
| 12875 | U.S.N.M. | 10 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m..... | Fragment. |
| 13243 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Rare. |
| 14053 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Few. |
| ...... | ........... | ...... | D5656... | 3 17 40 S.; 120 36 45 E... | 484 | 41.2 | gy. m....... | Few. |
| 13251 | U.S.N.M. | 5 | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Few. |
| 13247 | U.S.N.M. | 4 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Rare. |

### CYCLAMMINA PAUCILOCULATA Cushman.

Plate 16, figs. 3 *a*, *b*.

*Cyclammina pauciloculata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 653.

*Description.*—Test compressed, nautiloid, biconvex, peripheral margin subacute, umbilical region depressed, chambers 10 to 11 in number, sutures nearly straight to somewhat curved; surface smooth when perfect; supplementary apertural pores few in number.

Diameter up to 2 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9106) from *Albatross* station D5538, in 256 fathoms (468 meters), between Negros and Siquijor, bottom temperature 53.3° F. (11.8° C.). This species was abundant at this station, and was also found in the China Sea off southern Luzon; east coast of Luzon; off northern Mindanao; Gulf of Tomini, Celebes; and Gulf of Boni. These stations range in depth from 102 to 1,092 fathoms (187 to 1,998 meters), the average depth 530 fathoms (970 meters); bottom temperatures range from 36.3° to 59.6° F. (2.3° C. to 15.3° C.), the average being 44.0°F. (6.4° C.).

Both the bottom temperatures, which are much higher, and the depths, which are much less than the preceding species, show that it has a different habitat.

It may be most easily distinguished from *C. cancellata* by its compressed form, depressed umbilical region, and from both *C. cancellata* and *C. compressa* by its fewer chambers.

*Cyclammina pauciloculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14945 | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne.s., m., sh. | Rare. |
| 13241 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s.. | Rare. |
| 14946 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E... | 310 | 45.3 | gn. m....... | Rare. |
| 14947 | U.S.N.M. | 6 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............... | Common. |
| 9106 | U.S.N.M. | 10 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Common. |
| 9048 | U.S.N.M. | 1 | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m....... | Rare. |
| 13362 | U.S.N.M. | 10+ | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Common. |
| 12872 | U.S.N.M. | 4 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Few. |
| 12871 | U.S.N.M. | ...... | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Few. |

### CYCLAMMINA PUSILLA H. B. Brady.

Plate 16, figs. 4*a*, *b*.

*Cyclammina pusilla* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 53; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 353, pl. 37, figs. 20–23.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 111, fig. 172 (in text).

This small species was found at five *Albatross* stations, as follows: D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.); D5247, Gulf of Davao, 135 fathoms (247 meters); D5590, Sibuko Bay, Borneo, 310 fathoms (567 meters), bottom temperature 44.3° F (6.8° C.); D5621, between Gillolo and Makyan Islands, 298 fathoms (545 meters); and D5659, Gulf of Boni, 702 fathoms (1,284 meters), bottom temperature 39.0° F. (4.1° C.).

It may be distinguished from all the preceding species by its much smaller size, its diameter being 1 mm. or less.

*Cyclammina pusilla—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14064 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 12823 | U.S.N.M. | 1 | D5247... | 7 02 00 N.; 125 38 45 E.... | 135 | ....... | m........... | Rare. |
| 12874 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E.... | 310 | 44.3 | gn. m., s.... | Rare. |
| 12873 | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E.... | 298 | ....... | gy. and bk. s | Rare. |
| 12822 | U.S.N.M. | 1 | D5659... | 5 33 20 S.; 120 47 10 E.... | 702 | 39.0 | s., m........ | Rare. |

### CYCLAMMINA BRADYI Cushman.

*Trochammina trullissata* H. B. BRADY (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342, pl. 40, fig. 13 (not 14, 15).

*Cyclammina bradyi* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 113, figs. 174*a*, *b* (in text).

The only record for this species in the whole region is a single specimen at *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

*Cyclammina bradyi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 12821 | U.S.N.M. | 1 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.: 126 26 52 E.. | 494 | ° F.<br>41.2 | fne. gy. s..... | Rare. |

## Genus LITUOTUBA Rhumbler, 1895.

### LITUOTUBA LITUIFORMIS (H. B. Brady).

*Trochammina lituiformis* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 59, pl. 5, fig. 16; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 342, pl. 40, figs. 4-7.

*Lituotuba lituiformis* RHUMBLER, Nachr. kön. Ges. Wiss. Göttingen, 1895, p. 84.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 114, fig. 175 (in text).

There are two specimens from station D5236, Pacific Ocean, east coast of Mindanao, which are evidently this species. The division of the chambers is obscure. It consists of four coiled whorls and a short uncoiled portion. The earlier portion is not in one plane, but is more or less irregular, as is often the case in this species. The wall is composed of fine sand grains with numerous black specks and a light yellowish cement.

*Lituotoba lituiformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 13156<br>12331 | U.S.N.M.<br>U.S.N.M. | 1<br>1 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.. | 494 | ° F.<br>41.2 | fne. gy. s.... | Rare. |

## Genus AMMOBACULITES Cushman, 1910.

### AMMOBACULITES AGGLUTINANS (d'Orbigny).

Plate 17, fig. 4.

*Spirolina agglutinans* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 137, pl. 7, figs. 10–12.

*Haplophragmium agglutinans* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 301, pl. 32, figs. 19–26.

*Haplophragmium calcareum* FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 275, pl. 19, fig. 1 (not *H. calcareum* d'Orbigny).

*Ammobaculites agglutinans* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 115, fig. 176 (in text).

Throughout the region this species seems to occur at numerous stations, but never in great numbers, as do some of the other species of the genus. There is some variation in the color and material of which the test is made, according to bottom conditions. The stations are numerous, as noted, mostly in comparatively shallow and warm water. They range in depth from 14 to 750 fathoms (25 to 1,370 meters), most of the stations, however, being in less than 300 fathoms (549 meters), bottom temperatures, where recorded, ranging from 41.1° to 54.8° F. (5° C. to 12.6° C.), most of them being near 50° F. (10° C.) or more, the lower temperatures occurring at the deeper stations.

Most of the stations for this species are in the Archipelago proper, but a few of the records are from Sibuko Bay, Borneo, and north of Celebes.

*Ammobaculites agglutinans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | | D5110... | 13 59 20 N.: 120 75 45 E.. | 135 | 39.0 | dk. gy. m.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5214... | 12 25 18 N.: 123 37 15 E.. | 218 | 51.4 | gn. m........ | Rare. |
| | ........ | ...... | D5259... | 11 57 30 N.: 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Frequent. |
| | ........ | ...... | D5261... | 12 30 55 N.: 121 34 24 E.. | 145 | ....... | s. m......... | Frequent. |
| | ........ | ...... | D5262... | 13 53 00 N.: 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | Few. |
| | ........ | ...... | D5342... | 10 56 55 N.: 119 17 24 E.. | 14–25 | ....... | gy. m........ | Several. |
| | ........ | ...... | D5343... | 10 51 35 N.: 119 28 24 E.. | ...... | ....... | s., r......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5412... | 10 09 15 N.: 123 52 00 E.. | 162 | 54.8 | gn. m........ | Rare. |
| | ........ | ...... | D5438... | 15 54 42 N.: 119 44 42 E.. | 267 | 46.2 | gn. m........ | Rare. |
| | ........ | ...... | D5469... | 13 36 48 N.: 123 38 24 E.. | 500 | ....... | gn.m.(net)... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5470... | 13 37 40 N.: 123 41 09 E.. | 560 | ....... | m........... | Rare. |
| | ........ | ...... | D5529... | 9 23 45 N.: 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 3 | D5537... | 9 11 00 N.: 123 23 00 E.. | 254 | 53.5 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5585... | 4 07 00 N.: 118 49 54 E.. | 476 | 41.1 | gy. m........ | Rare. |
| | ........ | ...... | D5586... | 4 06 50 N.: 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5589... | 4 12 10 N.: 118 38 08 E.. | 260 | 45.7 | fne. gy.s., gy. m. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5612... | 0 38 00 S.: 121 45 40 E . | 750 | ....... | ............... | Rare. |

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## AMMOBACULITES TENUIMARGO (H. B. Brady).

*Haplophragmium tenuimargo* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 303, pl. 33, figs. 13–16.

*Ammobaculites tenuimargo* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 117, figs. 180–183 (in text).

Four specimens of this species of rather smaller size than may be typical, but otherwise of the form and character of the specimens shown in the figures by Brady, occurred at D5420, between Cebu and Bohol Islands, 127 fathoms (233 meters); bottom temperature, 59° F. (15° C.).

*Ammobaculites tenuimargo—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13490 | U.S.N.M. | 4 | D5420... | 9 49 35 N.; 123 45 00 E.. | 127 | 59.0 | gn. m....... | Rare. |

## AMMOBACULITES CALCAREUM (H. B. Brady).

Plate 17, fig. 3.

*Haplophragmium calcareum* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 302, pl. 33, figs. 5–12.

As might be expected from the records given in the *Challenger* Report, which were all but one from shallow water of the tropics, this species is common in the material from this region. It has occurred at a large number of stations and usually in considerable numbers. Specimens exceed in size those obtained by Brady, some of them measuring over 4 mm. in length. Apparently both microspheric and megalospheric forms of the species occur. The material of the test varies according to bottom conditions. It is always of fairly coarse material, but smoothly cemented, the proportion of colored cement being unusually large, as noted by Brady.

Most of the stations are in the Philippines proper, but a few are in the more southern region, in the Gulf of Boni, etc. In depth the stations range from 50 to 565 fathoms (91 to 1,074 meters), but three stations being less than 200 fathoms (366 meters), and few over 400 (732 meters). The range of depth compares rather well with that given from *Challenger* stations, at which this species occurred. Botton temperatures range from 40.1° to 55.4° F. (3.5° C. to 15.2° C.), and at the shallowest station, 50 fathoms (91 meters), the bottom temperature was 76.3° F. (24.6° C.).

*Ammobaculites calcareum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Few. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Few. |
| | | | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft. gn. m.... | Few. |
| | | | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Frequent. |
| | | | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m .... | Frequent. |
| | | | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s.... | Rare. |
| | | | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Frequent. |
| [illegible] | U.S.N.M. | | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Common. |
| [illegible] | U.S.N.M. | | D5237... | 8 09 06 N.; 126 31 45 E.. | 249 | 46.4 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 7 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Common. |
| | | | D5260... | 12 25 35 N.; 121 31 35 E.. | 284 | 51.4 | gn. m., s.... | Frequent. |
| | | | D5301... | 20 37 00 N.; 116 43 00 E.. | 208 | 50.5 | gy. m., s..... | Rare. |
| | | | D5406... | 10 40 15 N.; 124 15 00 E.. | 159 | 55.4 | gn. m ....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5449... | 13 21 36 N.; 124 00 30 E.. | 300 | ....... | ....... | Several. |
| [illegible] | U.S.N.M. | 3 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m ....... | Several. |
| ...... | ........... | ...... | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m. (m. b.) | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net).. | Common. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Few. |
| | | | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk. sh... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Frequent. |
| ...... | ........... | ...... | D5622... | Makyan Id. (NE.) N. 66° W | 275 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Several. |
| [illegible] | U.S.N.M. | 3 | | | | | | |
| | | | H4898... | 7 43 45 N.; 122 08 45 E.. | 221 | ....... | gy. m., glob. | Common. |

## AMMOBACULITES CASSIS (Parker).

Plate 14, fig. 4.

*Lituola cassis* PARKER (in Dawson's paper), Can. Nat., vol. 5, 1870, pp. 177, 180, fig. 3.

*Haplophragmium cassis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 304, pl. 33, figs. 17–19.

Two specimens of this species, fine and typical, occurred in one of the soundings of the Philippine Expedition, but unfortunately the station number in the bottle was obliterated, and therefore further data is lacking. This is all the more unfortunate, as this is the first record of this species from the North Pacific region. The other stations are in the colder water of the Atlantic, in shallow water.

*Ammobaculites cassis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | .......... | 2 | ......... | ................................ | ...... | ...... | ............ | Few. |

### AMMOBACULITES CYLINDRICUS Cushman.

Plate 17, fig. 5.

*Haplophragmium calcareum* (part), H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 23, fig. 6.

*Haplophragmium agglutinans* Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 275, pl. 19, fig. 2 (not *Spirolina agglutinans* d'Orbigny).

*Ammobaculites cylindricus* Cushman, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 441, figs. 15, 16.

*Description.*—Test free, elongate, cylindrical; early chambers planospiral, completely involute, with five to six chambers in each volution; later portion uncoiled, cylindrical, made up of a linear series of chambers; wall coarsely arenaceous, but the surface rather smoothly finished; aperture in the middle of the terminal face in the uncoiled portion simple; color, gray.

Length 2 mm.; diameter 0.5 to 0.75 mm.

This species has been found to occur at numerous stations throughout the region, ranging in depth from 18 to 554 fathoms (33 to 1,012 meters), most of the stations being between 200 and 400 fathoms (366 and 732 meters), bottom temperatures ranging from 40.1° to 53.3° F. (3.5° C. to 11.8° C.).

This species differs from the ordinary form of *A. calcareus* in its cylindrical shape, and from *A. agglutinans* in the greater proportion of coiled chambers, which are completely involute.

*Ammobaculites cylindricus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12473 | U.S.N.M. | 3 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s.... | Few. |
| | | | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh... | Abundant. |
| 8205 | U.S.N.M. | 4 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Frequent. |
| 12472 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m........ | Few. |
| 12477 | U.S.N.M. | 2 | | | | | | |
| 12471 | U.S.N.M. | 5 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Frequent. |
| 14069 | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s.... | Rare. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| 12474 | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s.......... | Rare. |
| 12475 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E,.. | 360 | ....... | .............. | Rare. |
| | | | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.8 | s............. | Rare. |
| 12476 | U.S.N.M. | 5 | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne. gy. s., gy. m. | Few. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m........ | Frequent. |
| 12478 | U.S.N.M. | 3 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn.m......... | Few. |
| 14070 | U.S.N.M. | 1 | | | | | | |
| 12479 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob. | Rare. |

### AMMOBACULITES REOPHACIFORMIS Cushman.

Plate 11, fig. 3; plate 14, fig. 3.

*Ammobaculites reophaciformis* Cushman, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 440, figs. 12–14.

*Description.*—Test free, elongate-fusiform; early portion consisting of chambers arranged in a close-coiled planospiral series, much compressed, later portion straight, *Reophax*-like, consisting of a linear series of chambers progressively increasing in size; wall coarsely arenaceous, rough, fairly thick, aperture circular, in the middle of the terminal face, often on a projecting, neck-like portion; color variable, usually white or gray.

Length up to 3.5 mm.; diameter 0.4 to 1 mm.

This species has proved to be one of the most common in the region. It is characteristic of the shallow water of the coral-reef region. It has occured at a large number of stations ranging in depth from 14 to 318 fathoms (25 to 582 meters). Two stations at a greater depth were 258 and 318 fathoms (472 and 582 meters). In one case a single specimen occured and in the other few. The great majority of the stations are in depths from 15 to 30 fathoms (27 to 55 meters). Bottom temperatures are not usually given at these shallow water stations, but where given they range from 75.7° to 76.3° F. (24.2° to 24.6° C.).

The early coiled portion separates the species from *Reophax*, but the later portion alone would be described as belonging to that genus. At first I took it to be the microspheric form of some species of *Reophax* but it is very abundant, and when perfect seems always to have the coiled early development. *Reophax scorpiurus*, which it in some ways resembles, is a common species in the same locality, but in the material examined was not seen to have a true close-coiled young in any case, although the young portion is often curved.

*Ammobaculites reophaciformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Abundant. |
| | | | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s., sh. | Abundant. |
| | | | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s........ | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | Co.......... | Common. |
| | | | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Common. |
| | | | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | (?) | fne. s........ | Abundant. |
| | | | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh........ | Rare. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh.... | |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 4<br>10+ | D5156... | 5 12 50 N.; 119 55·55 E... | 18 | ....... | fne. s., sh... | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s., blk. sp | Rare. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.: 120 35 30 E... | 318 | ....... | fne. s., sh... | Few. |
| [illegible] | U.S.N.M. | 9 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| | | | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| | | | D5182... | 11 30 40 N.; 123 23 20 E... | 24 | ....... | fne., s. m.... | Rare. |
| | | | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn. m....... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 10+<br>5 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5206... | 11 31 40 N.; 124 42 40 E... | 32 | ....... | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 4 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s.... | Frequent. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Few. |
| | | | D5220 .. | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Several. |
| [illegible] | U.S.N.M. | 1 | D5256... | 7 21 45 N.; 124 07 15 E... | 158 | ....... | m........... | Rare. |
| | | | D5276 .. | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., m. ..... | Few. |
| | | | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s.... | Several. |
| [illegible] | U.S.N.M. | 5 | D5478... | 10 46 24 N.; 125 16 30 E... | 57 | ....... | sh........... | Few. |
| [illegible] | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co..... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 1<br>5 | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m....... | Rare. |

### AMMOBACULITES PSEUDOSPIRALE (Williamson).

Plate 19, figs. 1, 2.

*Proteonina pseudospirale* Williamson, Recent Foraminifera of Great Britain, 1858, p. 2, pl. 1, figs. 2, 3.

*Haplophragmium pseudospirale* Siddall, Cat. British Recent Foram., 1879, p. 4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 302, pl. 33, figs. 1–4.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 45.

There are numerous specimens in the Philippine material which seem to be very close to this species, which is known from the North Atlantic. It has the general shape and character of the wall which characterizes British specimens, the only difference being in the more definite division of the chambers. The early part is coiled and the later part uncoiled, which should place it in the genus *Ammobaculites*. Many of the specimens seem somewhat like *A. calcareum*. It seems, however, distinct from that species at the stations at which it occurs. The material of the wall is either a dark material, probably some sort of sand or light calcareous material.

There are records for this species at 18 stations, ranging in depth from 88 to 554 fathoms (161 to 1,012 meters), the average 278 fathoms (508 meters), bottom temperatures range from 43° to 62.4° F. (6.1° to 16.8° C.), the average about 50° F. (10° C.). These stations include the following regions: Off Jolo; Verde Island Passage; Tanon Strait, east coast of Negros; off western Bohol; Sogod Bay, southern Leyte; east of Masbate; between Marinduque and Luzon; Pacific Ocean, east coast of Mindanao; off southeastern Mindoro; China Sea off southern Luzon; Ragay Gulf, Luzon; off northern Mindanao; between Negros and Siquijor; and to the south in Sibuko Bay, Borneo, and between Gillolo and Makyan Islands.

*Ammobaculites pseudospirale—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12468 | U.S.N.M. | 3 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s.... | Few. |
| 12465 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | Rare. |
| 12469 | U.S.N.M. | 1 | D5187... | 9 16 45 N.; 123 21 15 E... | 225 | 53.6 | sft. gn. m... | Rare. |
| 12462 | U.S.N.M. | 3 | D5198... | 9 40 50 N.; 123 39 45 E... | 220 | 53.9 | gn. m....... | Few. |
| 12466<br>12467<br>13312 | U.S.N.M. | 2<br>10+ | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Frequent. |
| 12461 | U.S.N.M. | 4 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 50.5 | gn. m....... | Few. |
| 12463 | U.S.N.M. | 4 | D5222... | 13 38 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m....... | Few. |
| 12464 | U.S.N.M. | 1 | D5237... | 8 09 06 N.; 126 31 45 E... | 249 | 46.4 | gn. m....... | Rare. |
| 12470 | U.S.N.M. | 5 | D5260... | 12 25 35 N.; 121 31 35 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 13313 | U.S.N.M. | 10+ | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s.... | Common. |
| 14756<br>8206 | U.S.N.M. | 10+ | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob. | Common. |
| 13315 | U.S.N.M. | 10+ | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s........ | Common. |
| 13314 | U.S.N.M. | 2 | D5385... | 13 24 50 N.; 123 03 70 E... | 327 | 62.4 | gy. m....... | Few. |
| 13316 | U.S.N.M. | 4 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............ | Few. |
| 13317 | U.S.N.M. | 4 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Few. |
| 13318 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Rare. |
| 13319 | U.S.N.M. | 3 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.8 | gn. m....... | Few. |
| 13320 | U.S.N.M. | 1 | D5622... | Makyan Id. (NE.), N. 66° W. | 275 | ....... | gy. m....... | Rare. |

## Genus PLACOPSILINA d'Orbigny, 1850.

### PLACOPSILINA CENOMANA d'Orbigny.

*Placopsilina cenomana* D'ORBIGNY, Prodr. Pal., vol. 2, 1850, p. 185, no. 758.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 315, pl. 36, figs. 1-3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 119, fig. 186 (in text).

*Lituola cenomana* JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 302.

*Lituola* (*Placopsilina*) *cenomana* W. B. CARPENTER, PARKER, and JONES, Intr. Foram., 1862, p. 143, pl. 11, figs. 11-14.

This species has been found several times attached to various genera of foraminifera or to shells or pebbles. It is most frequent in shallow water, but the depths have ranged from 18 to 494 fathoms (33 to 903 meters). The only stations at which the bottom temperature is given are D5236, 494 fathoms (903 meters), 41.2° F. (5.1° C.), D5217, 105 fathoms (193 meters), 63.1° F. (17.2° C.), and D5538, 256 fathoms (468 meters), 53.3° F. (11.8° C.).

*Placopsilina cenomana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh ... | Rare. |
| [illegible]<br>[illegible]<br>[illegible]<br>[illegible] | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| [illegible]<br>[illegible] | U.S.N.M. | 8 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s .... | Common. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5276... | 13 49 50 N.; 120 14 45 E... | 18 | ....... | sh., p., s.... | Rare. |
| [illegible] | U.S.N.M. | 7 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Frequent. |

## Genus TROCHAMMINA Parker and Jones, 1860.

### TROCHAMMINA SQUAMATA Jones and Parker.

Plate 17, fig. 2; plate 22, fig. 6.

*Trochammina squamata* JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 304.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 337, pl. 41, figs. 3*a*–*c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 120, figs. 187*a*, *b* (in text).

*Trochammina proteus* KARRER (part), Sitz. kais. Akad. Wiss. Wien, vol. 52, 1865, p. 494, pl. 1, fig. 6 (not 1-5, 7, 8).

A few specimens of this species were found at the following stations: D5219, between Marinduque and Luzon, 530 fathoms (969 meters), bottom temperature 50.8° F. (10.4° C.); D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5670, Macassar Strait, 1,181 fathoms (2,160 meters), bottom temperature 38.2° F. (3.4° C.), and H4897, Sulu Sea off western Mindanao, 1,570 fathoms (2,871 meters), no bottom temperature recorded.

*Trochammina squamata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12865 | U.S.N.M. | (?) | D5219... | 12 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m....... | |
| 12866 | U.S.N.M. | 1 | D5236... | 8 45 50 N.; 126 26 52 E... | 494 | 41.2 | fine gy. s.... | Rare. |
| 12867 | U.S.N.M. | 1 | D5670... | 1 19 00 S.; 118 43 00 E... | 1,181 | 38.2 | gy. m....... | Rare. |
| 14752 | U.S.N.M. | 1 | H4897... | 7 46 00 N.; 122 00 00 E... | 1,570 | ....... | gy. m., glob. | Rare. |

## TROCHAMMINA TURBINATA (H. B. Brady).

Plate 15, fig. 4.

*Haplophragmium turbinatum* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1 p. 50; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 312, pl. 35, figs. 9 *a–c*.

*Trochammina turbinatum* Eimer and Fickert, Zeitschr. wiss. Zool., vol. 65, 1 p. 695.

*Trochammina turbinata* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. fig. 189 (in text).

The only records from the region are two specimens of this speci from *Albatross* station D5439, west coast of Luzon, in 940 fatho (1,719 meters) and one specimen from D5637, Pitt Passage, in 7 fathoms (1,280 meters). These specimens are larger than the or nary, and have the general form of the species, but the apertu instead of being at the base of the apertural face, is small, se circular, and in the middle of the face.

*Trochammina turbinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abund |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13321 | U.S.N.M. | 2 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Rare. |
| 14055 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |

## TROCHAMMINA GLOBIGERINIFORMIS (Parker and Jones).

Plate 11, figs. 4, 5.

*Globigerina bulloides* Williamson, Recent Foraminifera of Great Britain. 1 p. 56, pl. 5, figs. 116–118 (not *G. bulloides* d'Orbigny, 1826).

*Lituola nautiloidea*, var. *globigeriniformis* Parker and Jones, Trans. Roy. London, vol. 155, 1865, p. 407, pl. 15, figs. 46, 47.

*Lituola* (*Haplophragmium*) *globigeriniformis* Terrigi, Nuovi Lincei Atti, 1 p. 175, pl. 1, fig. 3.

*Haplophragmium globeriniforme* Siddall, Cat. Brit. Rec. Foram., 1879, p. W. B. Carpenter, The Microscope, ed. 6, 1881, p. 561, figs. 320 *a*, *b*.

*Ammoglobigerina bulloides* Eimer and Fickert, Zeitschr. wiss. Zool., vol. 1899, p. 704.

*Trochammina globigeriniformis* Cushman, Bull. 71, U. S. Nat. Mus., pt. 1, 1 p. 124, figs. 193, 194 (in text).

Fine large specimens of this species are found at a great number of stations in the region. Although not definitely proven from the two sizes that appear, it would seem that both microspheric and megalospheric specimens of this species may be present.

In depth the stations range from 260 to 1,570 fathoms (475 to 2,871 meters), bottom temperatures from 36.3° to 49.4° F. (2.3° to 9.7° C.).

From the known conditions under which this species is best developed it is not strange to find few records in the Philippines proper, but most of them from the deeper water to the south. It was not found at all among the islands, but off the Pacific coast of Mindanao and China Sea off Luzon. Southward it was found in Sibuko Bay, Borneo; north of Celebes; between Gillolo and Makyan Islands; Patiente Strait; and Flores Sea.

*Trochammina globigeriniformis—Material examined.*

| Cat. No. | *Coll. of—* | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 8225<br>12861 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Frequent. |
| 12867 | U.S.N.M. | 3 | D5238 .. | 7 34 45 N.; 126 38 15 E.. | 380 | 43.0 | gn. m...... | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 14056 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 11 00 E.. | 495 | 49.4 | gy. m., co. s. | Rare. |
| 12855 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | ............ | Rare. |
| 12852 | U.S.N.M. | 2 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m...... | Rare. |
| | | | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m...... | Few. |
| 12853 | U.S.N.M. | 5 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | ............ | Few. |
| | | | D5609... | 0 11 00 S.; 121 16 00 E.. | 1,092 | 36.3 | gn. m...... | Few. |
| 12854 | U.S.N.M. | 10 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m...... | Common. |
| 12856 | U.S.N.M. | 2 | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. and bk. s. (m. b.). | Few. |
| 14057 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m .... | Few. |
| 14058 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m...... | Rare. |
| 14059 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m...... | Few. |
| | | | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gn. m...... | Few. |
| 14752 | U.S.N.M. | 1 | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy. m., glob. | Rare. |

## Genus AMMOCHILOSTOMA Eimer and Fickert, 1899.

### AMMOCHILOSTOMA ROTUNDATA Cushman.

*Ammochilostoma rotundata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 637, pl. 79, fig. 1.

*Description.*—Test nearly spherical or somewhat elongate, of few chambers, the last-formed chamber nearly covering all the previously formed ones; chambers arranged in an irregular coil; wall fairly thick, of fine sand grains with a grayish-brown cement; aperture narrow and elongate, near the middle of the terminal face of the last-formed chamber, but remote from the border of the preceding chamber.

Diameter about 1 mm.

This species was found in considerable numbers at one station, D5613, off Celebes, 752 fathoms (1,375 meters); bottom temperature not given. It has also occurred in fewer numbers at D5612, Gulf of Tomini, Celebes, 750 fathoms (1,370 meters); D5654, Gulf of Boni, 805 fathoms (1,472 meters), bottom temperature 38.3° F. (3.5° C.); and D5668, Macassar Strait, 901 fathoms (1,648 meters), bottom temperature, 38.2° F. (3.4° C.).

*Ammochilostoma rotundata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12594<br>12596 | U.S.N.M. | 10+ | D5612... | 0 38 00 S.; 121 45 40 E.... | 750 | ....... | .............. | Common. |
| 8513<br>11636<br>12597 | U.S.N.M. | 10+ | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m....... | Common. |
| 12595<br>12598 | U.S.N.M. | 4 | D5654... | 3 42 00 S.; 120 45 50 E.... | 805 | 38.3 | .............. | Few. |
| 12599 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E.... | 901 | 38.2 | gy. m....... | Few. |

## Genus AMMOSPHAEROIDINA Cushman, 1910.

### AMMOSPHAEROIDINA SPHAEROIDINIFORMIS (H. B. Brady).

*Haplophragmium sphaeroidiniformis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 313.

*Ammosphaeroidina sphaeroidiniformis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1, 1910, p. 128, fig. 202 (in text).

Specimens referable to this species were found at four stations: D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5348, Palawan Passage, 375 fathoms (686 meters); D5467, east coast of Luzon, 480 fathoms (878 meters); and D5621, Molucca Passage, 298 fathoms (545 meters).

*Ammosphaeroidina sphaeroidiniformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13189 | U.S.N.M. | 6 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Few. |
| 13188 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s........ | Rare. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m........ | Rare. |
| 13187 | U.S.N.M. | 2 | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. and bk. s. | Rare. |

### AMMOSPHAEROIDINA GRANDIS Cushman.

Plate 9, fig. 4; plate 16, fig. 5.

*Ammosphaeroidina grandis* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 442, figs. 17–19 (in text).

*Description.*—Test large, globular, in adults usually made up of three visible chambers, one large one and two smaller ones on the opposite side; wall coarsely arenaceous, but with a fairly smooth exterior; aperture at the base of the largest chamber crescentic or semicircular, nearly opposite the suture marking the juncture of the walls of the two smaller chambers; color, grayish-brown.

Diameter up to 3 mm.

This species is very much more common than the preceding, being found at a number of stations in the area. These range in depth from 106 to 494 fathoms (194 to 903 meters), and bottom temperatures 41.2° to 50.4° F. (5.1° to 10.1° C.).

The question may be raised as to whether or not this may be the microspheric form of the preceding species, but from its occurrence in far greater numbers and at such a large number of stations it would seem not to justify this idea, being the opposite of the usual occurrence of the microspheric form of this species.

All the records for this species are in the Philippine Archipelago, none of the records being from the region to the southward.

*Ammosphaeroidina grandis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Abundant. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Rare. |
| | | | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ....... | bk. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5382... | 13 15 20 N.; 122 45 30 E.. | 128 | ....... | m............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 50 18 E.. | 300 | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5656... | 3 17 40 S.; 120 36 45 E.. | 484 | 41.2 | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | gn. m., s..... | Few. |

### Genus SPHAERAMMINA Cushman, 1910.

*Sphaerammina* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 439.

*Description.*—Test composed of a series of chambers, the last one formed completely enveloping the preceding ones, but the axis straight; wall arenaceous.

*Type of the genus.*—*Sphaerammina ovalis* Cushman.

This genus strongly reminds one of *Ellipsoidina*, but there is an arenaceous wall, and the connections between the apertural ends of the chambers are indistinct or wanting. With its straight axis it belongs to the *Reophacinae*, and holds a relation to *Reophax* and *Ammosina* similar to that which *Glandulina* holds to *Nodosaria*.

### SPHAERAMMINA OVALIS Cushman.

Plate 11, figs. 6–8; plate 14, figs. 5*a*, *b*.

*Sphaerammina ovalis* CUSHMAN, Proc. U. S. Nat. Mus., vol. 38, 1910, p. 440, figs. 8–10.

*Description.*—Test oval or spherical, composed of a series of chambers, with a straight axis, each chamber as added extending back and enveloping the preceding; chambers oval or nearly spherical; wall of fine sand firmly cemented; aperture elliptical or rounded; color, grayish- or yellowish-brown.

Diameter 1 to 2 mm.

Specimens were common at the type station, D5236, Pacific Ocean, off eastern Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5621, between Gillolo and Makyan Island, 298 fathoms (545 meters); and also specimens which were typical in every way from D5637, near Bouro Island, 700 fathoms (1,280 meters), bottom temperatures not recorded in the last two cases.

*Sphaerammina ovalis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 8283<br>14819 | U.S.N.M.<br>U.S.N.M. | 6<br>3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s...... | Few. |
| 14809 | U.S.N.M. | 3 | D5621... | 0 15 00 N.; 127 24 36 E.. | 298 | ........ | gy. and bk. s. | Few. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ........ | gy. m........ | |

## Genus AMMOSPHAERULINA Cushman, 1912.

### AMMOSPHAERULINA ADHAERENS Cushman.

Plate 18, figs. 11, 12.

*Ammosphaerulina adhaerens* CUSHMAN, Proc. U. S. Nat. Mus., vol. 42, 1912, p. 229, pl. 28, figs. 11, 12.

*Description.*—Test spherical, adherent, wall arenaceous; composed of two or more chambers, each included by the one next-formed, eccentric; color light yellowish-brown.

Diameter about 0.75 mm.

Specimens of this species were found at *Albatross* station D5637, in the vicinity of Bouro Island, Dutch East Indies, 700 fathoms (1,280 meters), bottom temperature not recorded.

This is a peculiar form, somewhat like *Psammosphaera*, but having chambers entirely included by the one last-formed. On account of its small size and attached character it may easily be overlooked. The figured specimen was attached to a specimen of *Saccorhiza ramosa*.

*Ammosphaerulina adhaerens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5637... | ° ′ ″ ° ′ ″<br>3 53 20 S.; 126 48 00 E.. | 700 | °F.<br>....... | gy. m....... | Rare. |

## Genus NOURIA Heron-Allen and Earland, 1914.

### NOURIA HARRISII Heron-Allen and Earland.

*Nouria harrisii* Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, pt. 12, 1914, p. 376, pl. 37, figs. 16–20.

The following is the original description of this species:

Test free, fusiform, cylindrical to subcylindrical in section, consisting of two to four chambers arranged in a polymorphine manner and constructed entirely of sponge spicules arranged in a single layer with their axes arranged more or less parallel to the long axis of the test. The ultimate chamber terminating in a somewhat produced neck, on which is situated the aperture of the test, which is a circular opening. The lines of demarcation between the separate chambers are marked by very slight sutural depressions, but are principally recognizable owing to a divergence of the angles at which the spicules of adjacent chambers are arranged (fig. 18). The septation of the internal cavity is very incomplete, but the different successive chambers are recognizable in section by these sutural depressions, which extend as an incomplete septum into the cavity of the test. It follows that each of these incomplete septa must originally have formed a portion of the external wall of the test which has been absorbed in the course of growth, the spicules, no doubt, being rebuilt into the new investing wall.

We first noticed this form more than 20 years ago in dredgings made by the late Captain Seabrook, and given to us by our old friend and correspondent, the late Mr. W. H. Harris, of Cardiff. The dredgings in which the specimens occurred were made off Cebu in the Philippine Islands (depth 120 fathoms, volcanic mud) and in the Java Sea (45 fathoms). Identical specimens have since been observed in a dredging from the Sahul Bank, in the Timor Sea (60 fathoms), and in a dredging off Old Providence Island in the Caribbean Sea (382 fathoms). The peculiar and highly characteristic construction of the test is the same in all these widely separated localities; and, as sponge spicules do not form any marked proportion of the bottom in any of the dredgings the "selective" tendency must be regarded as exceptionally pronounced—just as striking, in fact, as in our species *Technitella thompsoni*,[8] which form a heterogeneous mass of available material, selects for the construction of its test nothing but the plates of an Ophiurid.

The skill, or "purpose," exhibited by this little organism in the building of its test reaches its most remarkable development in the construction of the aperture. The spicules designed to form the terminal portion of the shell are selected by the organism of such size and shape as to form a perfectly tapered neck with a circular aperture, round which the points of the spicules often form a regular fringe (figs. 17, 18, 20). It would appear that the organism utilizes only such spicules as are suitable for its purposes, owing to their tapering form, terminating in a sharp point, which allows the size of the aperture to be considerably reduced, as compared with the size which would have resulted from the utilization of broken or blunted spicules. The spicules employed are invariably of a simple type, and this is very noticeable in the Cebu specimens, as hexactinellid spicules abound in that dredging.

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[8] Journ. Quekett Micr. Club, ser. 2, vol. 10, 1909, pp. 403–412, pls. 31–35.

Heron-Allen and Earland, in describing this species, had material from off Cebu; I have failed to find any specimens in the Philippine material I have had.

#### NOURIA COMPRESSA Heron-Allen and Earland.

*Nouria compressa* Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, pt. 12, 1914, p. 378, pl. 37, figs. 21–26.

The original description of this species is as follows:

> Test free, highly compressed, consisting of 2 to 5 chambers rapidly increasing in size and arranged biserially, the walls of the test consisting of a single layer of sponge-spicules neatly cemented together into a smooth and finished surface. A grain of sand or glauconite is occasionally used to fill in a crevice between spicules (figs. 22 & 25). Marginal edges acute and usually smooth and unbroken, especially at the oral extremity of the shell. Less neat at the aboral end, where there is often a marginal fringe of projecting spicular points. Sutural lines nearly flush and obscure, but generally well marked, owing to the divergent angles at which the spicules are arranged in adjacent chambers. Aperture a neatly constructed terminal slit, sometimes with a slightly raised border or lip of cement (figs. 21, 23). Internal septa constructed of spicules and very often incomplete.

This species, described by Heron-Allen and Earland from the same station off Cebu, in 120 fathoms (220 meters), did not occur in any of the Philippine material I have had, but I have had very typical specimens from off the coast of Japan.

## Family TEXTULARIIDAE.

## Subfamily SPIROPLECTINAE.

### Genus SPIROPLECTA Ehrenberg, 1844.

#### SPIROPLECTA BULBOSA Cushman.

Plate 20, fig. 1.

*Spiroplecta bulbosa* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 5, figs. 1*a*, *b* (in text).

This species, originally described from the coast of Japan, has occurred at a single station, D5420, between Cebu and Bohol, 127 fathoms (233 meters); bottom temperature, 59.0° F. (15° C.).

The Philippine specimen seems to be typical.

*Spiraplecta bulbosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 14392 | U.S.N.M. | 1 | D5420... | 9° 49′ 35″ N.; 123° 45′ 100″ E.. | 127 | °F.<br>59 | .............. | Rare. |

## Subfamily TEXTULARIINAE.

### Genus TEXTULARIA Defrance, 1824.

### TEXTULARIA SAGITTULA Defrance.

Plate 20, figs. 2-4.

*Polymorphum sagittula* SOLDANI, Testaceographica, vol. 1, pt. 2, 1791, pp. 120 133, fig. T.

*Textularia sagittula* DEFRANCE, Dict. Sci. Nat., vol. 32, 1824, p. 177, vol. 53, p 344; Atlas, Conch., pl. 13, fig. 5.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology' vol. 9, 1884, p. 361, pl. 42, figs. 17, 18.

Typical material of this species was found at the following localities: Sulu Archipelago, Tawi Tawi Group; vicinity of Jolo; China Sea off southern Luzon; off northern Cebu; off western Samar; Verde Island Passage; between Negros and Siquijor; Mindoro Strait; east coast of Luzon; and vicinity of Darvel Bay, Borneo.

Some of the specimens measured as much as 4 mm. in length. Two interesting specimens are figured, plate 20, figs. 2-4, which had evidently been broken and started a new growth. In one case the axis of the new portion of the test is in the same line, but has been twisted about so that the chambers of the later part are at right angles to their former position. In the second the new portion of the test arises from the side of the earlier portion.

Such specimens show clearly that the test of the foraminifera is really an internal one, and that under certain conditions new growth may take place from any part.

*Textularia sagittula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ........ | gy. m., s., sh. | Few. |
| [illegible] | U.S.N.M. | 6 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Common. |
| | | | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ........ | co. s.......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ........ | co. s ......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5192... | 11 09 15 N.; 123 50 00 E... | 71 | ........ | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 2 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s ... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ........ | s. p.......... | Frequent. |
| | | | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s.............. | Rare. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ........ | gn. m........ | Rare. |
| | | | D5538... | 9 08 15 N.; 123 23 20 E... | 257 | 53.3 | gn. m., s.... | Rare. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co ... | Few. |
| [illegible] | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m....... | Rare. |

### TEXTULARIA SAGITTULA Defrance, var. ATRATA Cushman.

Plate 20, fig. 5.

*Textularia sagittula* DEFRANCE, var. *atrata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 7, figs. 2-5 (in text).

This variety has occurred at the following localities in few numbers: Tara Island; Sulu Sea; off northern Cebu; off southern Luzon; China

Sea, off Hongkong and off Formosa; off northern Mindanao; Palawan Passage; and Gulf of Tomini, Celebes.

The peculiar dark condition of the material above the sutures was noted in all the specimens.

Specimens from *Albatross* station D5315 show excellent senescent characters. The last-formed chambers of the test show a lateral narrowing so that the width of this portion of the test is reduced to one-half that of its maximum development.

The type material of this variety was from *Albatross* station D4875, in the eastern channel of the Korean Straits, in 59 fathoms (107 meters).

*Textularia sagittula*, var. *atrata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° F. | | |
| 12059 | U.S.N.M. | 2 | D5133... | Id. off Panabutan Pt., N. 52 E.; 150 miles. | 88 | ....... | gn. m., s..... | Common. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 12057 | U.S.N.M. | 1 | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh..... | Rare. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. m........ | Rare. |
| 12055<br>12056 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Rare. |
| 12064 | U.S.N.M. | 3 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Few. |
| 12058 | U.S.N.M. | 5 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh........ | Common. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co., s........ | Rare. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............... | Rare. |
| 12100 | U.S.N.M. | 1 | D5565... | 5 51 42 N.; 120 30 30 E... | 243 | 52.3 | s., ptr., sh... | |
| 12053 | U.S.N.M. | 3 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Few. |
| 12051 | U.S.N.M. | 2 | D5601... | 1 13 10 N.; 125 17 05 E... | 765. | ....... | s., glob., ptr. | Rare. |
| 12052 | U.S.N.M. | 2 | .......... | Tara Island............... | ....... | ....... | ............... | |

### TEXTULARIA SAGITTULA Defrance, var. FISTULOSA H. B. Brady.

Plate 20, fig. 6.

*Textularia sagittula* Defrance, var. *fistulosa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 362, pl. 42, figs. 19–22.

Brady mentions that this variety is principally found under tropical and subtropical conditions. It has occurred in the Philippine Expedition dredgings from two stations in the China Sea, off southern Luzon, D5105, 25 fathoms (46 meters), and D5300, in 265 fathoms (485 meters).

*Textularia sagittula*, var. *fistulosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12060 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s..... | Rare. |
| | | | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | ............... | |

### TEXTULARIA GRAMEN d'Orbigny.

Plate 20, fig. 7.

*Textularia gramen* D'ORBIGNY, Foram. Foss. Vienne, 1846, p, 248, pl. 15, figs.4, 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 365, pl. 43, figs. 9, 10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 8, figs. 6-8 (in text).

This is one of the most common species of the genus in the region and has been recorded from 28 stations, usually occurring in considerable numbers. As a rule it occurs in shallow water, but at two stations, D5636, Pitt Passage, it occurs in 1,262 fathoms (2,309 meters), and D5637, near Bouro Island, in 700 fathoms (1,280 meters) and 805 fathoms (1,472 meters). In each case a single specimen was found. The other stations, with a few exceptions, are mostly less than 50 fathoms (91 meters), the range being from 10 to 500 fathoms (18 to 914 meters). The range of temperature is from 38.3° to 75.7° F. (3.5° C. to 24.2° C.)., the lower temperature corresponding with the deeper water.

*Textularia gramen—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy.m.,s.,sh. | Rare. |
| 1417 | U.S.N.M. | 2 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy.s......... | |
| [illegible] | U.S.N.M. | 3 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk.gy.m.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk.gn.m.... | Rare. |
| [illegible] | U.S.N.M. | 7 | D5132... | Id. off Panabutan Pt. N. 15 W., 0.3 mile. | 26 | ....... | gn.m.,s..... | Few. |
| | | | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co.s.,sh..... | Rare. |
| | | | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co.s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd.s........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn.m....... | |
| | | | D5213... | 12 15 00 N.; 123 57 30 E... | 80 | ....... | s.,m.,sh..... | Rare. |
| | | | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs.s........ | |
| [illegible] | U.S.N.M. | 3 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s.,br.Co..... | Few. |
| | | | D5267... | 13 42 20 N.; 120 58 25 E... | 170 | ....... | p.,s.,sh..... | |
| | | | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.6 | s............ | Rare. |
| [illegible] | U.S.N.M. | 4 | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s ........ | |
| | | | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn.m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5478... | 10 46 24 N.; 125 16 30 E... | 57 | ....... | sh........... | Few. |
| | | | D5574... | 5 30 45 N.; 120 07 57 E... | 340 | ....... | ............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 42 30 E.. | 1,262 | ....... | gy.m.,fne.s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 46 00 E.. | 700 | ....... | gy.m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s.brk.sh.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E.. | 805 | 38.3 | ............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5658... | 3 32 40 S.; 120 31 30 E.. | 510 | 41.2 | gy.m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | .......... | Binang Pool, Subin Bay... | ....... | ....... | ............. | |

### TEXTULARIA HAUERII d'Orbigny.

Plate 19, fig. 6.

*Textularia hauerii* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 250, pl. 15, figs. 13.-15.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 628, pl. 47, figs. 21-23.

The original description of this species is as follows:

> A transition-form, which we figure, is generally distributed, and at the Stns. where it occurs is often one of the most abundant and typical. It seems to come

> nearer to d'Orbigny's *T. hauerii* than to any other Textularian. Brady regarded *T. hauerii* as merely a modification of *T. gramen* (*ut supra*) characterized by less angular edges, but the Kerimba specimens are sufficiently marked and divergent from *T. gramen*, as represented in these dredgings, to render the separation of the specimens desirable. In the somewhat rough texture of the shell their affinities appear to lie rather in the direction of *T. candeiana* than of *T. gramen*.
>
> The Kerimba specimens of *T. hauerii* have, as a rule, about eight pairs of chambers regularly increasing in breadth and thickness, and with the sutural lines somewhat depressed owing to the inflation of the chambers. Marginal edge lobulate and varying from rounded in the latter portion of the shell to acute or subcarinate in the initial portion. Surface-texture somewhat coarse, but neatly agglutinate. The species is most abundant at Stns. 1 and 12, reaching its best proportions at the latter. *T. hauerii* was recorded by d'Orbigny from the Tertiaries of Vienna. It is probably widely distributed, but has not been separated from the records of *T. gramen*.

In the above characterization of this species I heartily agree, and from two stations at least a similar form occurs. The specimens are from *Albatross* stations D5181, off eastern Panay in 26 fathoms (48 meters), and D5276, China Sea off southern Luzon in 18 fathoms (33 meters).

*Textularia hauerii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14174 | U.S.N.M. | 2 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s..... | Rare. |
| 14173 | U.S.N.M. | 3 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Rare. |

## TEXTULARIA AGGLUTINANS d'Orbigny.

Plate 20, fig. 8.

*Textularia agglutinans* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 136, pl. 1, figs. 17, 18, 32–34.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 363, pl. 43, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 9, figs. 10 *a*, *b* (in text).

Numerous records for this species, mostly from the southern portion of the area, have been obtained. These range in depth from 10 to 80 fathoms (18 to 146 meters), with a single record from D5574, north of Tawi Tawi Group, 340 fathoms (622 meters), and except for two other stations all the depths are for less than 40 fathoms (73 meters). Bottom temperatures are given in only two cases, these being 58.6° and 76.3° F. (14.7° C. and 24.6° C.).

The largest specimens are about 3 mm. in length.

*Textularia agglutinans*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 3 | D5097... | 14 19 15 N.; 120 34 15 E... | 28 | ....... | gy.m.,s..... | Few. |
| [illegible] | U.S.N.M. | 4 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne.s......... | Few. |
| [illegible] | U.S.N.M. | 6 | | | | | | |
| [illegible] | U.S.N.M. | 5 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co.s.......... | Few. |
| [illegible] | U.S.N.M. | 2 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co.s.,sh..... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ....... | co.s.,sh..... | Few. |
| | | | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh.s......... | Few. |
| | | | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co.s.......... | Rare. |
| | | | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co.s.......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne.s......... | Few. |
| [illegible] | U.S.N.M. | 4 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn.m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne.gy.s..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs.s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne.s......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5358... | 6 06 40 N.; 118 18 15 E... | 39 | ....... | m............ | Frequent. |
| [illegible] | U.S.N.M. | 6 | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne.gy.s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E... | 340 | ....... | .............. | Rare. |
| | | | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s.,brk.sh.... | Few. |
| | | | ......... | Off Singapore............ | 13 | ....... | .............. | Rare. |

### TEXTULARIA AGGLUTINANS d'Orbigny, var. FISTULA Cushman.

*Textularia agglutinans* D'ORBIGNY, var. *fistula* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 10, fig. 11 (in text).

The only record for this variety is a single specimen from D5576, north of Tawi Tawi, 277 fathoms (506 meters). This is similar to the material which I have described from off the Hawaiian Islands and from off Japan.

*Textularia agglutinans*, var. *fistula*—*Material examined.*

| Cat. No. | Collection of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | 1 | D5576... | 5 25 56 N.; 120 08 39 E.. | 277 | 53.3 | s............ | Rare. |

### TEXTULARIA STRICTA Cushman.

Plate 21, fig. 1.

*Textularia stricta* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 11, figs. 13*a*, *b* (in text).—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 20.

*Spiroplecta sagittula*, var. *fistulosa* CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905 (1906), p. 87, pl. 3, fig. 4.

Numerous typical specimens were found at five stations: D5272, China Sea, vicinity southern Luzon, 118 fathoms (216 meters), bottom temperature 57.4° F. (14.1° C.); D5256, off southern Mindanao, 8 fathoms (289 meters), bottom temperature not given; D5282, China Sea, vicinity southern Luzon, 248 fathoms (454 meters), bottom temperature 47.4° F. (10.7° C.); D5318, China Sea, vicinity Formosa, 340 fathoms (556 meters), bottom temperature not given;

and D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

This is a large and striking species, often several millimeters in length and very straight, long, and narrow. It was originally described from *Albatross* station D4900 in the Eastern Sea off southwestern Japan, in 139 fathoms (254 meters). In this region many southern species range to the north, and it is not surprising to find this species somewhat more abundant in the Philippines.

The Philippine specimens are not as large as those from the type station off Japan. Sidebottom records this species from off the east coast of Australia in 465 fathoms (850 meters). It seems to be distinct from *T. porrecta* as developed in the Philippine region, and probably is a distinct Indo-Pacific species. The early chambers of the test are not always Spiroplectine, although they seem to be in the largest specimens, probably indicating that both the microspheric (Spiroplectine) and megalospheric forms occur. The following notes are from Sidebottom's paper:

> Four occur, the largest having about forty chambers. They agree accurately with Cushman's description, excepting that the apertural end is not "somewhat acute." The same large tests occur at the *Challenger* St. 185, off Raine Island, but they are very roughly built.
>
> Further investigation may prove that these are a variant of *Textularia agglutinans*, var. *porrecta* Brady.
>
> Cushman's species appears to be identical with the forms recorded and figured by Chapman from Great Barrier Island, New Zealand, 110 fathoms, under the names *Spiroplecta sagittula* (Defrance) and *S. sagittula*, var. *fistulosa* Brady.[9] It is a very large form, typical of the "Thomson Basin," and abundant in dredgings from this area. The early structure is in our experience usually, if not invariably, Spiroplectine, and Cushman's figure suggests a Spiroplectine form, though his description contains no reference to this feature. But the *Dart* specimens are of a megalospheric Textularian type, and this would seem to be proof of dimorphism. The species deserves to be carefully worked out.

I agree with Sidebottom that Chapman's material, especially the figured specimen, belongs to this species. It is the microspheric form as shown in the figure and by its being placed under *Spiroplecta*.

*Textularia stricta—Material examined.*

| Cat. No. | Collection of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12067 | U.S.N.M. | 3 | D5236...<br>D5256... | 8 50 45 N.; 126 26 52 E..<br>7 21 45 N.; 124 07 15 E.. | 494<br>158 | 41.2<br>....... | fne. gy. s....<br>m........... | Few. |
| 12068<br>12069 | U.S.N.M. | 10+ | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Common. |
| 12071 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s .... | Rare. |
| 12070 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |

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[9] Chapman, 1906, Trans. Zealand Inst., vol. 38, 1905, p. 87, pl. 3, fig. 4.

### TEXTULARIA CANDEIANA d'Orbigny.

*Textularia candeiana* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 143, pl. 1, figs. 25–27.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 12, fig. 14–17 (in text).

*Textularia sagittula*, var. *candeiana* MILLETT, Journ. Roy. Micr. Soc., 1899, p. 562, pl. 7, fig. 12.

At two stations specimens of this species were rare. These were D5210, off western Samar, 50 fathoms (91 meters), bottom temperature 76.3° F. (24.6° C.), and D5630, south of Patiente Strait, 569 fathoms (1,081 meters), bottom temperature not recorded.

The previous North Pacific records for this species are off the Hawaiian Islands and Gaspar Straits. Millett records it in his Malay Archipelago paper in the region adjacent to that of our southern stations recorded here.

*Textularia candeiana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12048 | U.S.N.M. | 1 | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s.... | Rare. |
| 12049 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Rare. |

### TEXTULARIA PORRECTA H. B. Brady.

Plate 22, fig. 1.

*Textularia agglutinans* D'ORBIGNY, var. *porrecta* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 364, pl. 43, figs. 4*a*, *b*.

*Textularia porrecta* EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 269, pl. 6, figs. 17, 18.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 627.

Brady in the *Challenger* report refers to this variety as the "much elongated, subcylindrical, arenaceous Textulariae," which are very common "in some localities, especially about the coral reefs of the tropics." In the shallow water dredgings in the Philippine region this form is extremely abundant among the reefs, ranking with *T. rugosa*, *T. vertebralis*, and other species in numbers. It is not always found in company with specimens which may be referred to *T. agglutinans*, and withal in the Philippine material seems worthy of specific rank.

Specimens occur at many stations under 50 fathoms (91 meters), but comparatively few show greater depths. The species is much more common in the southern half of the Archipelago. In two cases the temperature of the bottom is given for the shallow-water stations, 76.3° F. (24.6° C.) and 79.5° F. (26.3° C.). A few specimens were found in material from the deeper stations, not in sufficient numbers to be classed as characteristic, but rather as an occasional specimen.

Heron-Allen and Earland record the species from the Kerimba Archipelago, off southeast Africa, apparently having the microspheric form with spiroplectine young.

*Textularia porrecta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14155 | U.S.N.M. | 4 | D5133 | Id. off Panabutan Pt., N. 52° E., 1.50 miles. | 33 | 79.5 | gn. m., s | Few. |
| 12102 | U.S.N.M. | 5 | | | | | | |
| 13137 | U.S.N.M. | 1 | D5146 | 5 46 40 N.; 120 48 50 E. | 24 | | co. s., sh | Rare. |
| 12107 | U.S.N.M. | 1 | D5192 | 11 9 15 N.; 123 50 00 E. | 32 | | gn. s | Rare. |
| 12106 | U.S.N.M. | 2 | D5210 | 11 49 55 N.; 124 28 06 E. | 50 | 76.3 | fne. gy. s | Rare. |
| 14139 | U.S.N.M. | 3 | D5217 | 13 00 20 N.; 123 14 15 E. | 105 | 63.1 | crs. gy. s | Few. |
| 12103 | U.S.N.M. | 1 | D5268 | 13 42 00 N.; 120 57 15 E. | 170 | | s., p. | Few. |
| 14135 | U.S.N.M. | 3 | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | | gn. m | Few. |
| 12105 | U.S.N.M. | 3 | D5478 | 10 46 24 N.; 125 16 30 E. | 57 | | sh | Few. |
| 13136 | U.S.N.M. | 6 | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m | Few. |
| 12101 | U.S.N.M. | 3 | D5529 | 9 23 45 N.; 123 39 30 E. | 441 | 53 | gy. m., glob. | Few. |
| 14138 | U.S.N.M. | 2 | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.3 | gn. m., s | Few. |
| 12104 | U.S.N.M. | 4 | D5590 | 4 10 50 N.; 118 39 35 E. | 310 | 44.3 | gn. m., s | Few. |
| 14140 | U.S.N.M. | 3 | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | Co., s | Few. |
| 14141 | U.S.N.M. | 1 | D5381 | 13 14 15 N.; 122 44 45 E. | 88 | | co., s | Rare. |
| 14142 | U.S.N.M. | 2 | D5592 | 4 12 44 N.; 118 27 44 E. | 305 | 43.3 | gn. m | Rare. |
| 14143 | U.S.N.M. | 1 | D5426 | 9 12 00 N.; 118 28 00 E. | 27 | | fne. gy. s | Rare. |
| 14144 | U.S.N.M. | 1 | D5138 | 6 06 00 N.; 120 58 50 E. | 19 | | s., Co | Rare. |
| 14145 | U.S.N.M. | 1 | D5358 | 6 06 40 N.; 118 18 50 E. | 39 | | m | Rare. |
| 14146 | U.S.N.M. | 10 | D5100 | 14 17 15 N.; 120 32 40 E. | 35 | | gy. s | Common. |
| 14147 | U.S.N.M. | 2 | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | br. s., Co. | Rare. |
| 14148 | U.S.N.M. | 5 | D5132 | Id. off Panabutan Pt., N. 15° W., 0.3 mile. | 26 | | gn. m., s | Few. |
| 14149 | U.S.N.M. | 5 | D5213 | 12 15 00 N.; 124 04 36 E. | 108 | 59.9 | gy. s., m | Few. |
| 14150 | U.S.N.M. | 8 | D5096 | 14 20 23 N.; 120 34 15 E. | 28 | | gy. m., s., sh. | Few. |
| 14151 | U.S.N.M. | 1 | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | | s., sh., g | Rare. |
| 14152 | U.S.N.M. | 1 | D5281 | 13 52 45 N.; 120 25 00 E. | 201 | 50.4 | dk. gy. s | Rare. |
| 14153 | U.S.N.M. | 2 | D5097 | 14 19 15 N.; 120 33 52 E. | 30 | | gy. m., s., sh. | Rare. |
| 14154 | U.S.N.M. | 2 | D5105 | 14 43 55 N.; 120 12 50 E. | 25 | | | Rare. |

### TEXTULARIA VERTEBRALIS Cushman.

Plate 22, fig. 3; plate 24, fig. 1.

*Textularia vertebralis* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 633, pl. 78, fig. 1.

*Description.*—Test elongate and tapering, chambers very numerous, in the adult portion rounded in cross-section, the distal portion of the chambers convex, the proximal portion concave behind the middle, chambers gradually increasing in size, wall composed of agglutinated sand usually fine and smoothly finished; aperture at the base of the inner margin of the chamber; color, gray.

Length up to 6 mm.

This is one of the most common species in the region, occurring in deeper water than the other common species, *T. rugosa*, *T. porrecta*, etc. The stations range from 80 to 742 fathoms (146 to 1,357 meters) in depth, the average 275 fathoms (503 meters), and the bottom temperatures where given from 43.3° to 59.6° F. (6.1° C. to 15.3° C.), most of them above 50° F. (10° C.).

This species is a very characteristic one, resembling a series of vertebrae, the chambers in adult specimens very numerous, as many as 60 having been counted in some specimens. It is also one of the largest species of the genus. At some of the stations it was very common.

Besides occurring in the Philippine Archipelago it occurred at several stations in the vicinity of Sibuko Bay, Borneo, and between Gillolo and Kayoa Islands.

*Textularia vertebralis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14101 | U.S.N.M. | 3 | D5110... | 13 21 30 N.; 120 30 33 E.. | 220 | ....... | gn. m....... | Few. |
| 14105 | U.S.N.M. | 1 | D5126... | 10 48 00 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Rare. |
| 14112 | U.S.N.M. | 8 | D5196... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Common. |
| 12081<br>14111 | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Abundant. |
| 14120 | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Few. |
| 14108 | U.S.N.M. | 8 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Frequent. |
| 14113 | U.S.N.M. | 7 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Few. |
| 14102 | U.S.N.M. | 8 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Frequent. |
| 14114 | U.S.N.M. | 1 | D5291... | 13 39 40 N.; 121 00 45 E.. | 173 | 51.5 | fne. bk. s.... | Rare. |
| 12076 | U.S.N.M. | 10+ | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Frequent. |
| 12080 | | | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m....... | Rare. |
| 14250 | U.S.N.M. | 1 | D5331... | 15 36 45 N.; 119 47 45 E.. | 178 | 54.7 | s., sh., m.... | Rare. |
| 14257 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s........ | Frequent. |
| 12079 | U.S.N.M. | 9 | D5430... | 9 49 40 N.; 119 03 20 E.. | 464 | 50 | glob. oz..... | Rare. |
| 14115 | U.S.N.M. | 2 | D5454... | 13 12 00 N.; 123 50 30 E.. | 153 | ....... | ............. | Rare. |
| 12077<br>8501 | U.S.N.M. | 10+ | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy. m., fne. s. | Frequent. |
| 14096 | U.S.N.M. | 3 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............. | Few. |
| 14119 | U.S.N.M. | 5 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53 | gy. m., glob. | Few. |
| 12082 | U.S.N.M. | 10+ | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Frequent. |
| 14109 | U.S.N.M. | 3 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | |
| | ......... | ...... | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk. sh.... | Rare. |
| 12078 | U.S.N.M. | 6 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52 | fne. s........ | Few. |
| 14121 | U.S.N.M. | 2 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s........ | Rare. |
| 14122 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Rare. |
| | ......... | ...... | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Few. |
| 14095 | U.S.N.M. | 4 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44 | gy. m....... | Rare. |
| 14094<br>14116 | U.S.N.M.<br>U.S.N.M. | 1<br>1 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Few. |
| 14117 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Few. |
| 14118 | U.S.N.M. | 3 | D5592... | 4 12 44 N.; 118 27 41 E.. | 305 | 43.3 | gn. m....... | Few. |
| | ......... | ...... | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s. | Few. |
| 14116 | U.S.N.M. | 4 | H4896... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Few. |

### TEXTULARIA APERTURALIS Cushman.

*Textularia solita* (SCHWAGER), var. *inflata* GOËS, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 42, pl. 5, figs. 1-3.

*Textularia aperturalis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 20, figs. 34, 35 (in text).

The only record for the region is from D5259, 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.). Although the aperture was not double as in the type, nevertheless it was very oblique, more on one side than the other, and the whole shape of the test was similar to the figured specimens.

*Textularia aperturalis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 12141 | U.S.N.M. | 1 | D5259... | ° ′ ″ ° ′ ″<br>11 57 30 N.; 121 42 15 E.. | 312 | ° F.<br>49.3 | gy. m., glob. | Rare. |

### TEXTULARIA CATENATA Cushman.

Plate 23, fig. 5.

*Textularia catenata* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 23, figs. 39, 40 (in text).

The species occurred at a single station, so far as noted, D5551, vicinity of Jolo Island, in 193 fathoms (353 meters), bottom temperature 53.3° F. (11.8° C.). The other North Pacific stations where this species has been recorded are very deep in comparison with this.

*Textularia catenata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 12142 | U.S.N.M. | 1 | D5551... | ° ′ ″ ° ′ ″<br>5 54 48 N.; 120 44 24 E.. | 193 | ° F.<br>53.3 | fne. s........ | Rare. |

### TEXTULARIA ASPERA H. B. Brady.

Plate 23, fig. 6.

*Textularia aspera* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 715; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 367, pl. 44, figs. 9-13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 14, figs. 21-23 (in text).

From a single station, D5121, east coast of Mindoro, 108 fathoms (198 meters), a few specimens of this species were obtained. It was not noted elsewhere in the region.

*Textularia aspera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 12147 | U.S.N.M. | 2 | D5121... | ° ′ ″ ° ′ ″<br>13 27 20 N.; 121 17 45 E... | 108 | ° F.<br>....... | dk. gn. m... | Rare. |

### TEXTULARIA GOËSII Cushman.

Plate 21, fig. 3.

*Textularia sagittula* DEFRANCE, var., Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, pl. 5, figs. 150–158.

*Textularia trochus* H. B. BRADY (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 366, pl. 43, fig. 17 (not 15, 16, 18, 19); pl. 44, figs. 1–3 (not *T. trochus* d'Orbigny).

*Textularia goësii* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 15, figs. 24*a*, *b* (in text).

At several stations material referable to this species was found representing the following localities: Sulu Archipelago, Tawi Tawi Group; China Sea, off southern Luzon; off southeastern Mindoro; north of Tawi Tawi; Mindoro Strait; vicinity of Jolo; and east coast of Luzon; San Bernardino Strait to San Miguel Bay.

*Textularia goësii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 4 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Common. |
| | | | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | Rare. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s., m.... .... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s.... | Rare. |
| [illegible] | | | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. ..... | Rare. |
| 12136 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |

### TEXTULARIA FLINTII Cushman.

Plate 22, fig. 4.

*Textularia agglutinans* FLINT (part), Rep. U. S. Nat. Mus., 1897 (1899), p. 284, pl. 29, fig. 4 (in part) (not *T. agglutinans* d'Orbigny).

*Textularia rugosa* BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 131, (not *T. rugosa* (Reuss)).

*Textularia flintii* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 21, figs. 36*a*, *b* (in text).

At three stations this species has been found: D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5301, China Sea, 208 fathoms (381 meters), bottom temperature 50.5° F. (10.2° C.); and D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (569 meters), bottom temperature, 44.0° F. (6.4° C.). The material was typical and in considerable numbers.

I have already elsewhere recorded this species from off the Hawaiian Islands, off Guam, and off the Bonin Islands, so it might have been expected in the Philippine region.

*Textularia flintii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12146 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 12092 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s..... | Rare. |
| 12091 | U.S.N.M. | 3 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Rare. |

### TEXTULARIA RUGOSA (Reuss).

Plate 23, figs. 3, 4.

*Plecanium rugosum* Reuss, Sitz. Akad. Wiss. Wien, vol. 59, 1869, p. 453, pl. 1, figs. 3*a*, *b*.

*Textularia rugosa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 363, pl. 42, figs. 23, 24.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 625, pl. 47, figs. 7–9.

Throughout the region in shallow water this species is common. Except in a few cases the depths are less than 50 fathoms (91 meters) and the most of these less than 25 fathoms (33 meters).

This is the first record of the species from the North Pacific, but it has been found in shallow water about several of the South Sea Islands. It is a typical coral-reef species and at some shallow water stations very abundant.

The bottom temperatures of the shallow water stations were recorded but once, that being 75.7° F. (24.2° C.), 37 fathoms (68 meters).

There is a tendency in the largest specimens which may attain a length of 6 mm. to contract the test, showing definite traces of senescence. At the same time there is also a tendency to lessen the amount of the excavations at the base of the chambers. In some of the specimens these excavations are very deep and sharply sculptured, giving the whole test a very ornate appearance. There is some considerable variation in the size and depth of the excavations, and they may become filled with amorphous material in some cases.

Besides being widely scattered in shallow water in the Archipelago proper, it is found to the southward in both Sibuko and Darvel Bays, Borneo, but not in the deeper water of other stations in this region.

The specimen recorded by Flint from deep water off Bermuda does not seem to belong here. Heron-Allen and Earland record it from the Kerimba Archipelago off south eastern Africa, and note[10] that they "have specimens from the Philippine Islands one-sixth inch in length."

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[10] Journ. Roy Micr. Soc., 1911, p. 310.

*Textularia rugosa.—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 6 | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co........... | Few. |
| [illegible] | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s......... | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5137... | 6 04 25 N.; 120 58 30 E.. | 20 | ....... | s., sh......... | Abundant. |
| [illegible] | U.S.N.M. | 10+ | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s.......... | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Few. |
| [illegible] | U.S.N.M. | 5 | D5147... | 5 41 40 N.; 120 47 10 E.. | 21 | ....... | co. s.......... | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co. s.......... | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh.... | Abundant. |
| [illegible] | U.S.N.M. | 9 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s.......... | Common. |
| | | | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s.......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s.......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E.. | 87 | 75.7 | hrd. s........ | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s.......... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| [illegible] | U.S.N.M. | 6 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s.......... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Common. |
| [illegible] | U.S.N.M. | 2 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Few. |
| [illegible] | U.S.N.M. | 1 | D5336... | 11 37 45 N.; 119 46 00 E.. | 46 | ....... | s., m.......... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh............. | Rare. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s.............. | Few. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co... | Few. |
| [illegible] | U.S.N.M. | 2 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh... | Rare. |
| | | | | From exterior of pearl oyster. | ....... | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 404 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5149... | 5 33 00 N.; 120 42 10 E.. | 10 | ....... | Co., sh...... | Few. |
| [illegible] | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Rare. |

## TEXTULARIA SIPHONIFERA H. B. Brady.

Plate 21, figs. 4–7.

*Textularia siphonifera* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 53; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 362, pl. 42, figs. 25–29.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 17, figs. 28, 29 (in text).
*Spiroplecta siphonifera* CHAPMAN, Proc. Roy. Soc. Victoria, vol. 22, 1909 (1910), p. 272, pl. 53, fig. 1.

This is one of the most abundant species of the genus in the shallow water of the region. The depth, except in six cases, is less than 90 fathoms (165 meters), most of them being less than 25 fathoms (46 meters). Single specimens have occurred in deeper water at D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature 53.8° F. (12.1° C.); D5569, north of Tawi Tawi Group, 303 fathoms (554 meters), bottom temperature 52.3° F. (10.1° C.); D5576, north of Tawi Tawi, 277 fathoms (506 meters), bottom temperature 53. 3° F. (11.8° C.). The temperatures at the other stations are usually not given for the shallow water, but in the single case recorded it is 75.7° F. (24.2° C.).

As a rule there are six series of siphons, but specimens with eight series are not infrequent. Specimens were found in which one of the series of siphons was split into two and later on were united.

Both microspheric and megalospheric specimens were found at numerous stations. This seems to be a species which is peculiar to coral-reef regions as has been noted in its occurrence elsewhere.

In the remainder of the North Pacific it is known as far north as southern Japan and as far east as the Hawaiian Islands. Southward the records include the Admiralty and Friendly Islands, but it is not recorded from the Australian region except as a fossil, nor did I find it in the material I have had from Murray Island on the Great Barrier Reef of Australia. Chapman records it from Funafuti. Brady gives a record from the Gulf of Suez, but Heron-Allen and Earland do not record it from the Kerimba Archipelago off south-eastern Africa. Its distribution, therefore, while wide, is evidently restricted within this range.

*Textularia siphonifera.—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14126 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Rare. |
| 14131 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ........ | fne. s........ | Common. |
| 12034 | U.S.N.M. | 8 | D5137... | 6 04 25 N.; 120 58 30 E.. | 20 | ........ | s., sh........ | Abundant. |
| 14124 | U.S.N.M. | 1 | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ........ | co. s......... | Rare. |
| 12031 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ........ | co. s., sh.... | Frequent. |
| 12033 | U.S.N.M. | 9 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ........ | co. s., sh.... | Common. |
| 14123 | U.S.N.M. | 2 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Rare. |
| 14128 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m.... | Rare. |
| 12035 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ........ | crs. s........ | Frequent. |
| 12036 | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ........ | sh., p., s..... | Few. |
| 14127 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14-25 | ........ | gy. m......... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ........ | co. s......... | Rare. |
| 12037 | U.S.N.M. | 1 | D5386... | 13 38 30 N.; 122 44 30 E.. | 287 | 62.4 | ............... | Rare. |
| 12038 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ........ | s., sh., g..... | Rare. |
| 14130 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ........ | ............... | Rare. |
| 12032 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| 14129 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............. | Rare. |
| 12039 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............. | Rare. |
| | | | | East end of Midway Island, Jolo Jolo. | ....... | ........ | ............... | Rare. |
| 14125 | U.S.N.M. | 10+ | .......... | From interior of pearl oyster. | ....... | ........ | ............... | Common. |

### TEXTULARIA SEMIALATA Cushman.

Plate 24, figs. 2, 3 *a*, *b*.

*Textularia semialata* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 634, pl. 80, figs. 6, 7.

*Description.*—Test much compressed, of numerous chambers, broader than high, the proximal outer angle of the adult chambers more or less projecting and extending backward, wall of fine sand, very smoothly finished; aperture at the inner margin of the chamber; color gray.

Length about 1 mm.

*Type specimen.*—Cat. No. 8504, U.S.N.M., from *Albatross* station D5214, east of Masbate Island, 218 fathoms (399 meters).

This species in some of its characters resembles *Bolivina beyrichi* Reuss. It is a true *Textularia*, however, and has many points in which it differs from that species. There is a considerable difference n the microspheric and megalospheric forms, both of which are here figured. The microspheric form is narrow at the beginning and continues this form for some time, finally broadening out somewhat. The megalospheric form starts almost at once to develop a broad test of fewer chambers, but each has the same characteristic shape of the chambers.

*Textularia semialata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 8504<br>12148<br>12149 | U.S.N.M | 3 | D5214... | ° ′ ″ ° ′ ″<br>12 25 18 N.; 123 37 15 E... | 218 | ° F.<br>51.4 | gn. m....... | Few. |

**TEXTULARIA FOLIACEA Heron-Allen and Earland.**

Plate 19, figs. 7 *a*, *b*.

*Textularia foliacea* HERON-ALLEN and EARLAND, Trans. Zool. Soc., London, vol. 20, 1915, p. 628, pl. 47, figs. 17-20.

The original description is as follows:

> Test free, highly compressed, consisting of seven to nine pairs of chambers, regularly increasing in width so as to give a leaf-shaped outline to the shell. Sutural lines depressed, often strongly marked, but at times very obscure, and obliquely set, so that the tapering off of the ultimate pair of chambers gives the characteristic diamond or foliaceous outline. Median line of the shell depressed below the marginal edges, aperture small and regularly textularian. Test composed of sand-grains and other adventitious substances firmly and neatly cemented together, but with a rough external surface.
>
> This is one of the most characteristic of the Kerimba Textulariidae, though not universally distributed. It occurs in the greatest abundance and in its best development at Stn. 1, and very fine examples were also obtained at Stn. 9. At Stns. 3 and 10 the specimens were less characteristic and showed a tendency to pass, by inflation of the chambers, into *T. hauerii*.
>
> The affinities of our species are between *T. luculenta* Brady and *T. hauerii* or *granen* d'Orbigny. It may be compared as regards its highly compressed and parallel-faced test with the *Textularia immensa* of Cushman[11] from which it differs only in the character of its aperture.
>
> We have specimens from Timor Sea (Java, 50 fms.), where it is frequent, and from Vavau (S. Pacific, 16 fms.). We have also observed specimens in some of Brady's unsorted material from Fiji at Cambridge, and a single specimen among his specimens of *T. agglutinans* from "Coral Reef, Australia, 17 fms." It is probably therefore widely distrubuted in coral-reef areas.
>
> Length, 1 to 1.5 mm.; breadth, 0.6; thickness, 0.3 mm.

---

[11] Proc. U. S. Nat. Mus., vol. 44, 1913, p. 633, pl. 79, fig. 2.

This species has occurred in very typical form in the Philippin material and was one of those laid aside in 1910 for later descriptio I agree with the authors that this is a very distinct species and th Philippine specimens are very close to the figured specimens Heron-Allen and Earland.

Most of the stations at which it is recorded are in warm shallo water, where *Calcarina*, *Alveolina* and other shallow-water genera a abundant.

The species probably has a wide distribution in coral-reef regio in the Indo-Pacific.

*Textularia foliacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14196 | U.S.N.M. | 1 | D5136 | 6 04 20 N.; 120 59 20 E. | 22 | | s., sh. | Rare. |
| 14198 | U.S.N.M. | 3 | D5145 | 6 04 30 N.; 120 59 30 E. | 23 | | co. s., sh | Few. |
| 14194 | U.S.N.M. | 4 | D5192 | 11 09 15 N.; 123 50 00 E. | 32 | | gn. s | Few. |
| 14193 | U.S.N.M. | 2 | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s. | Few. |
| 14199 | U.S.N.M. | 2 | D5236 | 8 50 45 N.; 126 26 52 E. | 494 | 41.2 | fne. gy. s | Few. |
| 14200 | U.S.N.M. | 1 | D5348 | 10 57 45 N.; 118 38 15 F. | 375 | 56.4 | co. s | Rare. |
| 14192 | U.S.N.M. | 3 | | Tacloban Anchorage, P. I. | | | | Few. |

### TEXTULARIA IMMENSA Cushman.

Plate 24, figs. 4*a*, b.

*Textularia immensa* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 633, pl. fig. 2.

*Description.*—Test large and broad, rhomboid, very much flattene chambers low and long; wall thick, of rather coarse angular sa grains imbedded in an unusually large amount of light gray ceme aperture consisting of a series of small openings running from t inner margin of the apertural face to the highest point at the dist end of the test, about 20 in number; color gray.

Length up to 6 mm.; breadth up to 4 mm.; thickness 0.5 m

*Type specimen.*—Cat. No. 8502, U.S.N.M., from *Albatross* statio D5567, north of Tawi Tawi, 268 fathoms (495 meters), botto temperature 52.0° F. (11.1° C.).

This is a very large species, and with its peculiar aperture is more than usual interest. The whole test is rhomboid, very flattene the two sides seeming to differ, one being slightly convex, the oth slightly concave, the concave side having the sutures more promine than the other.

It has occurred elsewhere in the region at station D5576, nor of Tawi Tawi, 277 fathoms (506 meters), bottom temperature 53.3° (11.8° C.).

*Textularia immensa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5567... | 5 48 00 N.; 120 33 45 E.... | 268 | 52 | fne. s ....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.... | 277 | 53.3 | s............ | Rare. |

### TEXTULARIA CONCAVA (Karrer).

*Plecanium concavum* Karrer, Sitz. kais. Akad. Wiss. Wien., vol. 58, 1868, p. 129, pl. 1, fig. 3.

*Textularia concava* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 360, pl. 42, figs. 11, 12 (not pl. 43, fig. 11).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 22, fig. 38 (in text).

Material of this species occurred at but two stations—D5096, China Sea off southern Luzon, 28 fathoms (51 meters), and D5590, Sibuko Bay, Borneo, 310 fathoms (567 meters). It does not seem to be common in the North Pacific, the only other material I have had being from off the Hawaiian Islands.

Millett records it from the Malay region.

*Textularia concava—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s..... | Rare. |

### TEXTULARIA JUGOSA H. B. Brady.

*Textularia jugosa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 358, pl. 42, figs. 7*a*, *b*.

A single specimen almost exactly like the figure given by Brady was found in material from D5551, vicinity of Jolo Island, 193 fathoms (353 meters), bottom temperature 53.3° F. (11.8° C.).

The *Challenger* material was from Torres Strait, 155 fathoms, and there are other records from the Indian Ocean and off Australia.

*Textularia jugosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | 1 | D5551... | 5 54 48 N.; 120 44 24 E.... | 193 | 53.3 | fne. s........ | Rare. |

### TEXTULARIA EXCAVATA Cushman.

Plate 24, figs. 5*a*, *b*.

*Textularia excavata* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 634, pl. 79, fig. 5.

*Description.*—Test rhomboid, composed of comparatively few chambers, early portion with the sides angled, later chambers broadly rounded at sides, chambers obliquely set, each forming an angle of 90° with the opposite chamber, distal portion of chamber thickened and tending to roll back, giving an excavated appearance to the test, outer face of last-formed chamber in adult broadly rounded and convex; aperture at the base of the inner margin of the chamber; wall composed of rather fine sand with a grayish-brown color, due partly to the cement.

Length up to 2 mm. in adult specimens.

*Type specimen.*—Cat. No. 8503, U. S. N. M., from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters). At this station the species was common. Its shape and peculiar sculptured test will distinguish it from other species.

This species has also been found at D5318, China Sea, vicinity of Formosa, 340 fathoms (556 meters), and D5591, Sibuko Bay, Borneo, 260 fathoms (475 meters). Bottom temperatures were not recorded at either of these stations.

*Textularia excavata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 8503<br>12127 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| 12128 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 12126 | U.S.N.M. | 3 | D5591 .. | 4 11 48 N.; 118 38 20 E... | 260 | ....... | .............. | Few. |

### TEXTULARIA TRANSVERSARIA H. B. Brady.

Plate 22, figs. 2 *a–c*.

*Textularia transversaria* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 359, pl. 113, figs. 3–5.

A few specimens which compare closely with Brady's species occurred at D5572, north of Tawi Tawi, 334 fathoms (1,611 meters), bottom temperature 52.3° F. (11.2° C.). Brady's specimens were from this same faunal area, off Raine Island, Torres Strait, 155 fathoms (283 meters), and off Kandavu, Fiji Islands, 255 fathoms (466 meters).

*Textularia transversaria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |

**TEXTULARIA CRASSISEPTA Cushman.**

Plate 23, fig. 1.

*Textularia crassisepta* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 24, figs. 41 *a*, *b* (in text).

Specimens which were typical were found at three stations—D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (635 meters), bottom temperature 44° F. 6.6° C.); and D5121, east coast of Mindoro, 108 fathoms (198 meters), bottom temperature not given.

The type specimens were from off the Hawaiian Islands, *Albatross* H3007, in 323 fathoms (590 meters).

*Textularia crassisepta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12344 | U.S.N.M. | 2 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Few. |
| 14173 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 12163 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44 | gy. m....... | Rare. |

**TEXTULARIA PSEUDOCARINATA, new name.**

Plate 22, fig. 5.

*Textularia carinata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 360, pl. 42, figs. 15, 16 (not *T. carinata* d'Orbigny).—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 17, figs. 26, 27*a*, *b* (in text).

From a study of d'Orbigny's descriptions and figures of this species with a series of recent Philippine specimens it seems that the recent tropical species is a different one from the fossil one in many ways. In this recent tropical species the carina is broad and has very prominent denticulations and a heavy layer of agglutinated material above the sutures connecting across the middle and united with the material of the carina at either side. Brady records this species at *Challenger* station 209 in 95 fathoms (174 meters) off the Philippines. Our specimens are almost identical with the figured specimens in the *Challenger* Report. I have had material from the following stations: D5121, east coast of Mindoro, 108 fathoms (198 meters); D5272, China Sea, vicinity southern Luzon, 118 fathoms (203 meters), bottom temperature 57.4° F. (14.1° C.); D5261, off southeastern Mindoro, 145 fathoms (265 meters); D5543, northern Mindanao and vicinity, 162 fathoms (297 meters), bottom temperature 54.5° F. (12.5° C.); H4898, Sulu Sea off western Mindanao, 221 fathoms (404 meters).

*Textularia pseudocarinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12073 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| 12075 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Rare. |
| 12074 | U.S.N.M. | 3 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m..sh.,co.s. | Rare. |
| 12072 | U.S.N.M. | 4 | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............ | Rare. |
| 14219 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Rare. |

### TEXTULARIA ABBREVIATA d'Orbigny.

Plate 21, figs. 2*a*, *b*.

*Textularia abbreviata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 249, pl. 15, figs. 9–12 (7–12).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 14, figs. 20*a*, *b* (in text).

Specimens referred to this species are common in the dredgings throughout the region, occurring at a large number of stations. They are similar to the figure given in the North Pacific Monograph referred to above. It may be questioned whether the specimen I figured there really is the *T. abbreviata* of d'Orbigny, but throughout the Philippine region and beyond, the specimens agree well with my figured specimen. Most of the stations are in the Philippine Archipelago, but the species is also common in the vicinity of Sibuko Bay, Borneo. In depth the stations vary from 108 to 775 fathoms (198 to 1,417 meters), and the bottom temperature from 41.1° to 59.9° F. (5° to 15.5° C.).

*Textularia abbreviata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5115... | 13 37 11 N.; 120 43 40 E... | 340 | ....... | ............... | |
| | | | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | |
| | | | D5201... | 19 19 99 N.; 125 94 15 E... | 554 | 53.8 | gy. s., m.... | |
| 3170 | U.S.N.M. | 1 | D5203... | 9 58 00 N.; 125 07 40 E... | 775 | 52.9 | gn. m....... | Rare. |
| | | | D5212... | 12 04 15 N.; 124 04 36 E... | 106 | 59.9 | gy. s., m.... | |
| [illegible] | U.S.N.M. | 6 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m....... | Few. |
| | | | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m....... | |
| [illegible] | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Common. |
| | | | D5260... | 12 26 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m....... | |
| [illegible] | U.S.N.M. | 4 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Few. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s........ | |
| | | | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m... | |
| | | | D5430... | 9 49 40 N.; 119 03 20 E... | 464 | 50 | glob. os..... | |
| | | | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | |
| | | | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | |
| [illegible] | U.S.N.M. | 5 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Few. |
| [illegible] | U.S.N.M. | 10+ | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53. | gy. m., glob. | Common. |
| [illegible] | U.S.N.M. | 5 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Few. |
| | | | D5569... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob. | |
| | | | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44 | gy. m....... | Rare. |
| | | | D5589. | 4 12 10 N.; 118 38 08 E... | 260 | ....... | Co........... | |
| [illegible] | U.S.N.M. | 10+ | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Frequent. |
| | | | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | ............... | |

### TEXTULARIA CONICA d'Orbigny.

Plate 25, figs. 2*a–c*.

*Textularia conica* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 143, pl. 1, figs. 19, 20.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 365, pl. 43, figs. 13, 14; pl. 113, figs. 1*a*, *b*.

This species is a common one on tropical coral reefs. Most of the specimens are from stations less than 40 fathoms (73 meters) in depth, the bottom temperature in the only case given being 75.7° F. (24.2° C.). Except for the two stations in the vicinity of Darvel Bay, Borneo, the species has occurred in the Philippine Archipelago. At the following six stations the species has occurred in more than 40 fathoms (73 meters): D5217, between Burias and Luzon, 105 fathoms (193 meters), bottom temperature 63.1° F. (17.2° C.); D5311, China Sea, vicinity of Hongkong, 88 fathoms (161 meters); D5315, China Sea, vicinity of Formosa, 148 fathoms (271 meters), bottom temperature 54.4° F. (12.4° C.); D5481, between Samar and Leyte, vicinity of Surigao Strait, 61 fathoms (112 meters); D5579, vicinity of Darvel Bay, Borneo, 175 fathoms (320 meters), bottom temperature 55.3° F. (15.1° C.); D5580, vicinity of Darvel Bay, Borneo, 162 fathoms (297 meters), bottom temperature 55.8° F. (13.2° C.).

*Textularia conica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12115 | U.S.N.M. | 7 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m ....... | Common. |
| 12110 | U.S.N.M. | 8 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s ....... | Common. |
| 14162 | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Few. |
| 14157 | U.S.N.M. | 2 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s ....... | Rare. |
| 12113 | U.S.N.M. | 2 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s....... | Frequent. |
| 12111 | U.S.N.M. | 10 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s ....... | Frequent. |
| 14161 | U.S.N.M. | 3 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Few. |
| 12114 | U.S.N.M. | 5 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s ....... | Frequent. |
| 12112<br>12116 | U.S.N.M.<br>U.S.N.M. | 5<br>9 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s.... | Common. |
| | | | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh. | Few. |
| 14156 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh.... | Few. |
| 14159 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Few. |
| 14160. | U.S.N.M. | 1 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co... | Few. |
| 14158. | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Few |

### TEXTULARIA TROCHUS d'Orbigny.

Plate 25, figs. 1*a*–*c*.

*Textularia trochus* D'ORBIGNY, Mém. Soc. géol. France, vol. 4, 1840, p. 45, pl. 4, figs. 25, 26.—VANDEN BROECK, Ann. Soc. Belg. Micr., vol. 2, 1876, p. 132, pl. 3, figs. 11, 12.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 366, pl. 43, figs. 15, 16, 18, 19 (not fig. 17).—HERON-ALLEN and EARLAND, Trans. Zool. Soc., London, vol. 20, 1915, p. 630, pl. 47, fig. 28.

The records for this species show that it is most common in warm shallow water, especially in the southern part of the Archipelago. The stations range from 18 to 277 fathoms (33 to 507 meters), only two of them, however, being greater than 37 fathoms (68 meters). These are D5212, 108 fathoms (198 meters), east of Masbate Island, and D5576, 277 fathoms (507 meters), north of Tawi Tawi. At both of these stations specimens were rare. In all cases the bottom temperatures were relatively high—59.9° F. (15.5° C.), 53.3° F. (11.8° C.), and 75.7° F. (24.2° C.).

*Textularia trochus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12040<br>12042 | U.S.N.M. | 7 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m....... | Frequent. |
| 12041 | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s....... | Few. |
| 12043 | U.S.N.M. | 5 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Few. |
| 12047 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s....... | Few. |
| 12044 | U.S.N.M. | 4 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s....... | Few. |
| 14134 | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m.... | Few. |
| 12046 | U.S.N.M. | 4 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p....... | Few. |
| 14132 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Few. |
| 12045 | U.S.N.M. | 3 | .......... | Jolo Jolo, P. I.......... | ...... | ....... | .......... | Few. |
| 14133 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s........... | Rare. |

### TEXTULARIA QUADRILATERA Schwager.

Plate 23, figs. 2*a*, *b*.

*Textularia quadrilatera* Schwager, *Novara*-Exped., Geol. Theil, vol. 2, 1866, p. 253, pl. 7, fig. 10.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 358, pl. 42, figs. 8–12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 24, figs. 42–44 (in text).

*Bolivina quadrilatera* Wright, Proc. Roy. Irish Acad., ser. 3, vol. 1, 1891, p. 475.

This species has occurred at a large number of stations, and its range of depth is very consistent with the records from other portions of the North Pacific. The stations vary in depth from 230 fathoms to 1,599 fathoms (420 to 2,775 meters), the majority of these being between 500 and 800 fathoms (914 and 1,463 meters). Both microspheric and megalospheric forms occur in considerable numbers and are easily distinguished at a glance, the character of the initial portion of the test being very different—that of the microspheric form narrow, tapering to a point, while the megalospheric form is blunt and broad at the initial end. The spine at the initial end is not always present.

*Textularia quadrilatera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E.. | 340 | ....... | fne. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m..... | Few. |
| | | | D5203... | 9 58 00 N.; 125 07 40 E.. | 775 | 52.9 | gn. m......... | Rare. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | |
| [illegible] | U.S.N.M. | 7 | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m......... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s..... | Few. |
| | | | D5446... | 12 43 64 N.; 124 59 18 E.. | 300 | ....... | gn. m......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob.. | Few. |
| | | | D5612... | 0 38 00 N.; 121 45 40 E.. | 750 | ....... | ............. | |
| [illegible] | U.S.N.M. | 6 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | Co............ | Few. |
| | | | D5625... | 0 07 00 S.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s. | Rare. |
| | | | D5636... | 1 55 00 S.; 127 42 30 E.. | 1,262 | ....... | gy. m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 120 48 00 E.. | 700 | ....... | gy. m......... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy. m., s..... | Rare. |
| | | | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m......... | Rare. |
| [illegible] | U.S.N.M. | 1 | Nero 855. | 15 26 30 N.; 121 47 15 E.. | 1,599 | ....... | gn. m....... | Rare. |

## Genus BIGENERINA d'Orbigny, 1826.

### BIGENERINA NODOSARIA d'Orbigny.

Plate 26, fig. 2.

*Bigenerina nodosaria* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 261, pl. 11 figs. 9–11; Modèles, 1826, No. 57.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 369, pl. 44, figs. 14–18.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 27, figs. 46–48 (in text).

*Textularia agglutinans*, var. *nodosaria* Parker and Jones, Philos. Trans. Roy. Soc., vol. 155, 1865, p. 371, pl. 15, fig. 25; pl. 17, fig. 80.

This is the most common species of the genus in the region. The test is usually of coarse material, in most cases light colored, and at a few stations is covered by a nearly black coating. There are numerous records of its occurrence in depths varying from 13 to 508 fathoms (25 to 930 meters) with a number of stations less than 300 fathoms (549 meters). Where given, the bottom temperature ranges from 44.3° to 76.3° F. (6.8° to 24.6° C.).

All but one of the stations, that from Sibuko Bay, Borneo, are in the Archipelago, or in the China Sea; off southern Luzon, off western Bohol; between Marinduque and Luzon; off northwestern Panay; off Palawan; between Cebu and Bohol; Jolo Sea; between Negros and Siquijor and north of Tawi Tawi.

*Bigenerina nodosaria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m.... | Few. |
| 14241 | U.S.N.M. | 5 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Few. |
| 14207 | U.S.N.M. | 7 | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s..... | Common. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m ... | Frequent. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy m., glob. | Few. |
| | | | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Frequent. |
| 12980 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Rare. |
| | | | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Frequent. |
| 12981 | U.S.N.M. | 4 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | cr. s., sh.... | Common. |
| 14239 | U.S.N.M. | 7 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Frequent. |
| 14206 | U.S.N.M. | 10+ | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co .... | Frequent. |
| 14240 | U.S.N.M. | 5 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m....... | Frequent. |
| | | | D5420... | 9 49 35 N.; 123 45 00 E.. | 127 | 59.0 | .............. | Few. |
| | | | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m., co. s.. | Frequent. |
| 12979 | U.S.N.M. | 1 | D5430... | 9 49 40 N.; 119 03 20 E.. | 464 | 50.0 | glob. oz..... | Rare. |
| 14238 | U.S.N.M. | 2 | D5449... | 13 21 36 N.; 124 00 30 E.. | 300 | ....... | .............. | Rare. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob.. | Few. |
| 14237 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s..... | Few. |
| 12978 | U.S.N.M. | 2 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s........... | Rare. |
| 12976<br>12977 | U.S.N.M. | 6 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Common. |
| | | | .......... | Off Singapore............ | 13 | ....... | .............. | Common. |

### BIGENERINA ARENACEA Bagg.

*Bigenerina arenacea* Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 132, pl. 5, figs. 4–6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 29, figs. 50*a*, *b* (in text).

A single specimen very much like that figured[12] was found in the dredgings made at D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

Bagg's specimens were from off the reefs of the Hawaiian Islands.

*Bigenerina arenacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 12985 | U.S.N.M. | 1 | D5236... | 8 45 50 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |

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[12] Bull. 71, pt. 2, fig. 50.

### BIGENERINA CAPREOLUS (d'Orbigny).

Plate 26, figs. 1*a*, *b*.

*Valvulina capreolus* D'ORBIGNY, Ann. Sci. Nat., vol. 2, 1826, p. 264, pl. 11, figs. 5, 6; Modèles, 1826, No. 59.

*Grammostomum capreolus* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 11, 1863, p. 93.

*Bigenerina capreolus* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 372, pl. 45, figs. 1–4.

Several excellent specimens were obtained from material dredged at D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature, 41.2° F. (5.1° C.). In depth this agrees well with the *Challenger* records for this species. Apparently it is the first record for the Pacific Ocean.

*Bigenerina capreolus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ' " ° ' " | | °*F.* | | |
| [illegible]<br>[illegible] | U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |

### BIGENERINA PENNATULA (Batsch).

Plate 25, figs. 3*a*, *b*.

"*Orthoceratia pupa*" SOLDANI, Testaceographica, vol. 1, pt. 2, 1791, p. 99, pl. 108, figs. D. E. F.

*Nautilus* (*Orthoceras*) *pennatula* BATSCH, Conch. des Seesandes, 1791, No. 13, pl. 4, figs. 13, *a–d*.

*Bigenerina pennatula* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 373, pl. 45, figs. 5–8.

A single well-developed, typical specimen was obtained from material dredged at D5318, China Sea, vicinity Formosa, 340 fathoms (556 meters), bottom temperature not recorded. This is apparently the first record for this species in the Pacific. This species is also recorded at D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

*Bigenerina pennatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ' " ° ' " | | °*F.* | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| | | 1 | D5318.. | 21 32 00 N.; 117 46 00 E.... | 340 | ....... | s., br. Co.... | Rare. |

## Genus BOLIVINA d'Orbigny, 1839.

### BOLIVINA DILATATA Reuss.

Plate 26, fig. 6.

*Bolivina dilatata* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 381, pl. 48, fig. 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 418, pl. 52, figs. 20, 21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 33, fig. 54 (in text).

A single specimen, evidently of this species, was obtained from D5580, vicinity Darvel Bay, Borneo, 162 fathoms (297 meters), bottom temperature 55.8° F. (13.8° C.). It occurred also at D5115, Balayan Bay and Verde Island Passage, 340 fathoms (556 meters); bottom temperature not recorded.

*Bolivina dilatata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13015 | U.S.N.M. | 2 | D5115... | 13 37 11 N.; 120 43 40 E... | 340 | ....... | ............... | Rare. |
| 13014 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |

### BOLIVINA BEYRICHI Reuss.

*Bolivina beyrichi* Reuss, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 83, pl. 6, fig. 51.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 422, pl. 53, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 34, fig. 56 (in text).

Specimens of this species were obtained from two stations: D5126, Sulu Sea, vicinity southern Panay, 742 fathoms (1,357 meters), bottom temperature 49.5° F. (19.8° C.); and D5300, China Sea, 265 fathoms (485 meters), bottom temperature not given. These specimens were of the typical narrow form.

*Bolivina beyrichi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12996 | U.S.N.M. | 3 | D5126... | 10 34 45 N.; 121 47 30 E... | 742 | 49.5 | sft. gn. m ... | Rare. |
| 14362 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.... | 265 | ....... | gy. m., s.... | Rare. |

### BOLIVINA BEYRICHI Reuss, var. ALATA (Seguenza).

*Vulvulina alata* Seguenza, Atti Accad. Gioenia Sci. Nat., ser. 2, vol. 18, 1862, p. 115, pl. 2, figs. 5, 5a.

*Bolivina alata* Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 296, pl. 8, fig. 27.

*Bolivina beyrichi*, var. *alata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 422, pl. 53, figs. 2-4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 35, figs. 57*a*, *b* (in text).

Brady in the *Challenger* report records this variety from off the Philippines in 95 fathoms (174 meters). I have noted it in material dredged at D5133, Sulu Sea, off western Mindanao, 38 fathoms (69 meters); D5259, off northwestern Panay, 312 fathoms (571 meters); bottom temperature 49.3° F. (9.6° C.); D5300, China Sea, vicinity of southern Luzon, 265 fathoms (484 meters); and D5438, west coast of Luzon, Manila Bay to Lingayen Gulf, 297 fathoms (543 meters), bottom temperature 46.2° F. (7.8° C.). The typical form of the species was also found at station D5300.

*Bolivina beyrichi*, var. *alata*—*Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5259 | 11 57 30 N.; 121 42 15 E | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300 | 20 31 00 N.; 115 49 00 E | 265 | ........ | gy. m., s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5438 | 15 54 42 N.; 119 44 42 E | 297 | 46.2 | gn. m. | Rare. |
| | | | D5133 | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ........ | gn. m., s. | |

### BOLIVINA ROBUSTA H. B. Brady.

*Bolivina robusta* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 57; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 421, pl. 53, figs. 7-9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 36, figs. 59, 60 (in text).

*Bolivina acaulis* Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 295, pl. 8, figs. 28-30.

This species has been found at several stations. From these few records it would seem that it is a fairly common species in the region, as the most of the washed material did not contain small forms. The specimens found were of the form without the apical spine, with the basal reëntrants few but distant.

The localities include stations between Panay and Negros; off northwestern Panay; China Sea, off Hongkong and off southern Luzon; off Jolo; and to the southward in Buton Strait and Macassar Strait.

*Bolivina robusta—Material examined.*

| Cat. No. | Coll. of— | No. of species. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14222 | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn. m....... | Rare. |
| 11663 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 14223 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Few. |
| 11665 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| 11667 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Rare. |
| 14229 | U.S.N.M. | 1 | D5514... | 8 32 42 N.; 123 58 36 E.. | 697 | 52.3 | gn. m., s.... | Rare. |
| 14226 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob.. | Rare. |
| 14225 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 58.3 | fne. co. s..... | Rare. |
| | | | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |
| 14224 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E.. | 315 | 52.3 | Co., s....... | Few. |
| 14227 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |
| 14228 | U.S.N.M. | 3 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Few. |
| 11666 | U.S.N.M. | 7 | D5648... | 5 35 00 S.; 122 20 00 E.. | 559 | 39.2 | gn. m....... | Common. |
| | | | D5665... | 4 27 00 S.; 118 44 00 E.. | 1,008 | ....... | m........... | Rare. |
| 11668 | U.S.N.M. | 3 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Few. |

### BOLIVINA SCHWAGERIANA H. B. Brady.

*Bolivina schwageriana* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 58; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 425, pl. 53, figs. 24, 25.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 38, figs. 63*a*, *b* (in text).

This species occurs mostly in the southern portion of the region at depths varying from 162 to 1,262 fathoms (297 to 2,309 meters); bottom temperature, where recorded, 47.5° to 55.8° F. (10.8° to 13.2° C.).

Material is typical, with the exception of slight traces of costae at the initial end in some cases.

Only one of the stations is in the Archipelago, off the east coast of Luzon; the others, Darvel Bay, Borneo; Gulf of Tomini, Celebes; off Bouro Island; Pitt Passage; and Macassar Strait.

This is a fairly large species for this genus and is strikingly ornamented. It is apparently very closely restricted in the general Australian and East Indian region.

*Bolivina schwageriana—Material examined.*

| Cat. No. | Coll. of— | No. of species. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 11669 | U.S.N.M. | 1 | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh.... | Rare. |
| 11670 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 11671 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s. glob., ptr.. | Rare. |
| 11672 | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 42 30 E.. | 1,262 | ....... | gy. m., fne. s. | Rare. |
| 11673 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Rare. |
| 11674 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

### BOLIVINA NOBILIS Hantken.

*Bolivina nobilis* HANTKEN, Magy. Kir. földt. int. évkönyve, vol. 4, 1875 (1876), p. 56, pl. 15, fig. 4; Mitth. Jahrb. Ung. geol. Anstalt, vol. 4, 1875 (1881), p. 65, pl. 15, fig. 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 424, pl. 53, figs. 14, 15.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 39, figs. 64*a*, *b* (in text).

The only records of this species are D5133, Sulu Sea off western Mindanao, 38 fathoms (70 meters), bottom temperature not given; D5268, Verde Island Passage and Batangas Bay, 170 fathoms 312 meters), bottom temperature not given; D5580, vicinity of arvel Bay, Borneo, 162 fathoms (297 meters), bottom temperature 5.8° F. (13.2° C.); and D5666, Macassar Strait, 272 fathoms (498 eters), bottom temperature 47.5° F. (10.8° C.).

This seems to be largely confined to the region of the Indo-Pacific, ing found eastward to the Hawaiian Islands, southward to Austra- and northward to the Philippines. Chapman has found it as a ssil in the Tertiary of Victoria. Egger records it from several calities, but his figures do not seem to be this species.

*Bolivina nobilis—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Rare. |
| U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Rare. |
| U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |
| U.S.N.M. | 1 | | | | | | |

### BOLIVINA KARRERIANA H. B. Brady.

Plate 26, fig. 4.

*Bolivina karreriana* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 58; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 424, pl. 53, figs. 19–21.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 40, figs. 65*a*, *b* (in text).

Specimens occur rarely at several stations, one off the east coast of Luzon; the others to the southward of the Archipelago; off Darvel Bay, Borneo; between Gillolo and Makyan Islands; south of Bouro land; and Macassar Strait. Depths range from 23 to 517 fathoms 42 to 946 meters).

*Bolivina karreriana—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5250... | 7 05 07 N.; 125 39 45 E.. | 23 | ....... | co. s........ | Rare. |
| U.S.N.M. | 1 | D5443... | 12 34 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh.... | Rare. |
| U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 43.3 | gn. m., s.... | Rare. |
| | | D5530... | 9 26 45 N.; 123 38 30 E.. | ....... | ....... | ............ | Rare. |
| U.S.N.M. | 1 | D5622... | Makyan Island (N. E.) N. 66° W. | 275 | ....... | gy. m....... | Rare. |
| U.S.N.M. | 1 | D5638 .. | 3 45 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Rare. |
| U.S.N.M. | 4 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Few. |

### BOLIVINA KARRERIANA H. B. Brady, var. CARINATA Millett.

Plate 27, fig. 1.

*Bolivina karreriana* H. B. Brady, var. *carinata* Millett, Journ. Roy. Micr. Soc 1900, p. 546, pl. 4, fig. 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 4] figs. 66*a*, *b* (in text).

Specimens of this variety and almost identical with the figur given by Millett occurred at two stations: D5255, Gulf of Davac 160 fathoms (290 meters), bottom temperature not recorded; D527ξ China Sea, vicinity southern Luzon, 102 fathoms (187 meters) bottom temperature 59.6° F., (15.3° C.) and D5443, east coast c Luzon, 241 fathoms (441 meters), bottom temperature 51.3° I (10.6° C.). The typical form of the species was not found at any c these stations.

*Bolivina karreriana, var. carinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12990<br>12994 | U.S.N.M. | 3 | D5255... | 7 08 00 N.; 126 39 00 E.. | 160 | ....... | sft. m....... | Few. |
| 12996 | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne.s.,m.,sh. | Rare. |
| 11606 | U.S.N.M. | 2 | D5443... | 12 43 06 N.; 126 01 06 E.. | 241 | 51.3 | crs. s.,sh.... | Rare. |

### BOLIVINA HANTKENIANA H. B. Brady.

Plate 27, fig. 2.

*Bolivina hantkeniana* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 5 Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 424, pl. 53, figs. 16–18.—Cusi man, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 42, figs. 68*a*, *b* (in text).

From the records this is the most common species of the genus i the region. Material is in considerable numbers and well distribute From a study of the material, both microspheric and megalospher forms of this species are present. In depth the range is from 26 t 1,262 fathoms (21 to 2,309 meters). The bottom temperature where given, range from 43.3° to 55.8° F. (6.1° to 13.2° C.).

In the southern portion of the area specimens were found D5592, vicinity of Sibuko Bay, Borneo, 305 fathoms (558 meters D5636, Pitt Passage, 1,262 fathoms (2,309 meters); and D566 Macassar Strait, 272 fathoms (498 meters).

This seems to be definitely an Indo-Pacific species, now known far east as the Hawaiian Islands, southward to Tahiti and Australi and northward to southern Japan. Its western limits are not w known. Heron-Allen and Earland did not find it in the Kerim Archipelago material off southeastern Africa.

*Bolivina hantkeniana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5132... | Island off Panabutan Point, N. 15° W., 0.30 mile. | 26 | ....... | gn. m., s .... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Few. |
| [illegible] | U.S.N.M. | 3 | | | | | | |
| [illegible] | U.S.N.M. | 1 | | | | | | |
| [illegible] | U.S.N.M. | 10 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m .... | Abundant. |
| [illegible] | U.S.N.M. | 8 | D5269... | 13 35 45 N.; 120 58 30 E.. | 220 | ....... | fne. s., p .... | Abundant. |
| [illegible] | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Few. |
| | | | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5487... | 10 02 45 N.; 125 05 33 E.. | 732 | 52.3 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m........ | Rare. |
| | | | D5636... | 1 55 00 S.; 127 42 3 E.. | 1,262 | ....... | gy. m., fne. s | Rare. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m........ | Rare. |
| | | | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Frequent. |

### BOLIVINA AMYGDALAEFORMIS H. B. Brady.

Plate 26, fig. 3.

*Bolivina amygdalaeformis* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 59; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 426, pl. 53, figs. 28, 29.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 42, figs. 69*a*, *b* (in text).

Specimens occurred rarely at five stations: D5133, Sulu Sea, off western Mindanao, 38 fathoms (70 meters), bottom temperature not given; D5178, vicinity of Romblon, 73 fathoms (133 meters); D5311, China Sea, vicinity Hongkong, 88 fathoms (161 meters); D5381, Raygay Gulf, Luzon, 88 fathoms (161 meters); bottom temperature not recorded in the latter cases; and D5572, north of Tawi Tawi, 334 fathoms (611 meters), bottom temperature 52.3° F. (11.2° C.). The *Challenger* obtained two specimens in 95 fathoms (173 meters), off the Philippine station 209.

This is another of the Indo-Pacific species, and from the published records rather more circumscribed in its distribution than many others of this same fauna.

*Bolivina amygdalaeformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 6 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 73 | ....... | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | | | | | | |
| [illegible] | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s., sh....... | Rare. |

*Bolivina limbata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11643 | U.S.N.M. | 1 | D5133... | Island off Panabutan Pt., N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Rare. |
| | | | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| 11645 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s....... | Rare. |
| | | | D5145... | 6 05 50 N.; 121 02 15 E... | 23 | ....... | co. s., sh.... | |
| 11647 | U.S.N.M. | 3 | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | grs. s., brk.. | Rare. |
| 14205 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s., sh ... | Rare. |
| 11646 | U.S.N.M. | 4 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 11644 | U.S.N.M. | 2 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Rare. |
| 11648 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Rare. |

### BOLIVINA PYGMAEA H. B. Brady.

*Bolivina pygmaea* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 57; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 421, pl. 53, figs. 5, 6.

A single typical specimen was obtained from D5514, northern Mindanao and vicinity, 697 fathoms (1,274 meters), bottom temperature 52.3° F. (10.1° C.); and another from D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature, 47.5° F. (8.5° C.). Apparently this is the first record of the species in the Pacific. The specimens were practically identical with Brady's figure of this species in the *Challenger* Report.

*Bolivina pygmaea*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14203 | U.S.N.M. | 1 | D5514... | 8 32 42 N.; 123 58 36 E.. | 697 | 52.3 | gn. m., s.... | Rare. |
| 14390 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m........ | Rare. |

### BOLIVINA PUNCTATA d'Orbigny.

Plate 26, fig. 5.

*Bolivina punctata* D'ORBIGNY, Voyage Amér. Mérid., vol. 5, pt. 5, 1839, "Foraminifères", p. 63, pl. 8, figs. 10–12.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 417, pl. 52, figs. 18, 19.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 32, figs. 53*a*, *b* (in text).

This species has been noted at but six stations: Apra Bay, Guam; D5096, China Sea, off southern Luzon, 28 fathoms (51 meters), bottom temperature not recorded; D5100, China Sea, off southern Luzon, 35 fathoms (64 meters), bottom temperature not given; D5192, off northern Cebu, 32 fathoms (59 meters), no bottom temperature; D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); and D5300, China Sea, vicinity southern Luzon, 265 fathoms (485 meters), bottom temperature not given. The apparent rarity of this common species may be due to the lack of fine material already referred to.

*Bolivina punctata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | .......... | Apra Bay, Guam.......... | ....... | ....... | .............. | Rare. |

### BOLIVINA COMPACTA Sidebottom.

Plate 26, fig. 7.

*Bolivina robusta* H. B. Brady, var. *compacta* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, No. 5, 1905, p. 15, pl. 3, fig. 7.

*Bolivina compacta* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 36, figs. 58*a*, *b* (in text).

At two stations this species was noted—D5546, vicinity of Jolo Island, 138 fathoms (252 meters), bottom temperature 58.3° F. (14.6° C.); and D5601, Gulf of Tomini, Celebes, 765 fathoms (1,399 meters). It was previously recorded from a *Nero* station near the Philippines.

*Bolivina compacta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5546...<br>D5601... | 6 06 48 N.; 121 20 32 E....<br>1 13 10 N.; 125 17 05 E.... | 138<br>765 | 58.3<br>....... | fne. co. s....<br>s., glob., ptr. | Rare. |
| [illegible] | U.S.N.M. | 1 | Nero 855 | ........................ | ...... | ....... | .............. | Rare. |

### BOLIVINA AENARIENSIS (Costa).

*Brizalina aenariensis* Costa, Atti Acad. Pont., vol. 7, 1856, p. 297, pl. 15, figs. 1*A*, *B*.

*Bolivina aenariensis* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 711, table; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 423, pl. 53, figs. 10, 11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 292, pl. 37, fig. 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 44, figs. 71*a*, *b* (in text).

Brady records this species from a single station off the Philippines, 95 fathoms (173 meters). It has also occurred at D5133, Sulu Sea, off western Mindanao, 38 fathoms (70 meters), bottom temperature not recorded, and D5318, China Sea, vicinity Formosa, 340 fathoms (622 meters), bottom temperature not recorded.

*Bolivina aenariensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 13002 | U.S.N.M. | 1 | D5133... | Island off Panabutan Pt., N. 52° E., 1.50 miles. | 38 | ° F.<br>....... | gn. m., s.... | Rare. |
| 13001 | U.S.N.M. | 1 | D5318... | 21° 32′ N.; 117° 46′ E...... | 340 | ....... | s., br. Co.... | Rare. |

### BOLIVINA PUSILLA Schwager.

*Bolivina pusilla* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 254, pl. 7, fig. 101.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 41, fig. 67 (in text).

This is one of the species described by Schwager from Kar Nicobar, so many of which are found in this general region. I have noted it from the North Pacific and from off the Hawaiian Islands and near Japan in fairly deep water. The only Philippine material is from *Albatross* station D5655, Gulf of Boni, 608 fathoms (1,112 meters).

*Bolivina pusilla—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 11662 | U.S.N.M. | 1 | D5655... | 3° 34′ 10″ S.; 120° 50′ 30″ E... | 608 | ° F.<br>39.2 | gy. m., fne. s | Rare. |

## Genus PLEUROSTOMELLA Reuss, 1860.

### PLEUROSTOMELLA ALTERNANS Schwager.

*Pleurostomella alternans* SCHWAGER, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 238, pl. 6, figs. 79, 80.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 412, pl. 51, figs. 22, 23.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 50, fig. 81 (in text).

The only station at which this species occurred in the region is *Albatross* station D5236, in 494 fathoms (903 meters), in the Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). The material was typical. The only other record for the North Pacific is an *Albatross* station, D2806, off the Galapagos Islands. This Philippine record, therefore, greatly extends its known distribution in this ocean.

The *Challenger* stations were from the Ki Islands off New Guinea in 129 fathoms (236 meters). and a station south of the Low Archipelago in 2,075 fathoms (3,795 meters). Sidebottom records a single immature specimen from the east coast of Australia in 465 fathoms (850 meters), and Chapman had it from 1,050 fathoms (1,920 meters) off Funafuti, and records it from the Arabian Sea. It seems to be a rather rare species.

*Pleurostomella alternans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible]<br>[illegible] | U.S.N.M. | 2 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.. | 494 | °F.<br>41.2 | fne. gy. s.... | Rare. |

**PLEUROSTOMELLA SUBNODOSA (Reuss).**

*Nodosaria nodosa* Reuss (part), Verst. Böhm. Kreid., pt. 1, 1845, p. 28, pl. 13, fig. 22.

*Dentalina subnodosa* Reuss (part), Haidinger's Nat. Abhandl., vol. 4, 1850, p. 24, pl. 1, fig. 9.

*Pleurostomella subnodosa* Reuss, Sitz. Akad. Wiss. Wien., vol. 40, 1860, p. 204, pl. 8, figs. 2*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 412, pl. 52, figs. 12–13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 51, fig. 82 (in text).

This species was only found at *Albatross* station D5236 in 494 fathoms (903 meters), Pacific Ocean off east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). The material was typical. It occurred at *Nero* station 842, in 1,330 fathoms (2,433 meters), off the coast of Luzon.[13]

*Pleurostomella subnodosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1<br>1 | D5236...<br>*Nero* 842 | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E..<br>........................ | 494<br>...... | °F.<br>41.2<br>...... | fne. gy. s....<br>............ | Rare. |

## Subfamily VERNEUILININAE.

### Genus VERNEUILINA d'Orbigny, 1840.

**VERNEUILINA POLYSTROPHA (Reuss).**

Plate 32, fig. 1.

*Bulimina polystropha* Reuss, Verst. Böhm. Kreid., pt. 2, 1845, p. 109, pl. 24, fig. 53.

*Verneuilina polystropha* Parker and Jones, Introd. Foram., 1862, p. 311.— H. B. Brady, Rep. Voy *Challenger*, Zoology, vol. 9, 1884, p. 386, pl. 47, figs. 15–17.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 53, figs. 85*a*, *b* (in text).

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[13] Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 51.

This species was common at two adjacent stations—D5445, 38 fathoms (699 meters), and D5446, 300 fathoms (549 meters), bot off the east coast of Luzon. It also occurred in fewer numbers a D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (90 meters), bottom temperature 41.2° F. (5.1° C.), and D5589, Sibuk Bay, Borneo, and vicinity, 260 fathoms (475 meters), bottom ten perature 45.7° F. (7.6° C.).

*Verneuilina polystropha—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13263 | U.S.N.M. | 4 | D5236... | 8 30 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 13266 | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Rare. |
| 13265 | U.S.N.M. | 10+ | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | | gn. m...... | Frequent. |
| 13264 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Rare. |

**VERNEUILINA PROPINQUA H. B. Brady.**

*Verneuilina propinqua* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 188 p. 387, pl. 47, figs. 8–12 (not 13, 14).—Cushman, Bull. 71, U. S. Nat. Mu pt. 2, 1911, p. 53, figs. 86*a*, *b* (in text).

Specimens of this species have occurred at six stations, all bu one in the region south of the Equator. Where they occur th species seems to be abundant, and numerous specimens show de nitely the attachment at the apertural end. One specimen show the abnormal twinned condition.

The stations are D5236, Pacific Ocean, east coast of Mindana 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C. D5446, off eastern Luzon, 300 fathoms (549 meters); D5612, nor of Celebes, 750 fathoms (1,370 meters); D5613, north of Celeb 752 fathoms (1,375 meters), bottom temperature not recorded either case; D5637, vicinity Bouro Island, 700 fathoms (1,280 meter bottom temperature not recorded; D5654, Gulf of Boni, 805 fatho (1,470 meters), bottom temperature 38.3° F. (3.5° C.).

*Verneuilina propinqua—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13282 | U.S.N.M. | 10+ | D5236... | 8 30 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 13283 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m....... | Rare. |
| 13250<br>13251 | U.S.N.M. | 5 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Few. |
| 13284 | U.S.N.M. | 5 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Few. |
| 13279 | U.S.N.M. | 5 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Few. |
| 14045 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 130 45 50 E.. | 805 | 38.3 | ............... | Rare. |

### VERNEUILINA BRADYI Cushman.

Plate 27, fig. 4.

*Verneuilina pygmaea* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 385, pl. 47, figs. 4-7 (not *Bulimina pygmaea* Egger).
*Verneuilina bradyi* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 54, figs. 87*a*, *b* (in text).—Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1013.

This species occurs in few numbers, but at numerous stations, the depth ranging from 23 to 525 fathoms (42 to 927 meters), bottom temperatures, where recorded, 41.1° to 64.1° F. (5° to 17.8° C.).

This is a very widely distributed species, but does not seem to occur in shallow water, as noted in the Pacific material about Japan. The same thing is true in the Philippine dredgings.

*Verneuilina bradyi—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ; ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E.. | 191 | 64.1 | sft. gy. m... | Rare. |
| U.S.N.M. | 1 | D5246... | 6 29 15 N.; 126 18 45 E.. | ...... | ...... | .............. | Rare. |
| | | D5449... | 7 06 06 N.; 125 40 08 E.. | 23 | ...... | Co., s......... | Rare. |
| U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Rare. |
| | | D5586... | 4 06 40 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| U.S.N.M. | 1 | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ...... | gy. m., fne. s | Rare. |
| U.S.N.M. | 1 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m........ | Rare. |
| | | ........ | Philippine expedition without number. | ...... | ...... | .............. | Rare. |

### VERNEUILINA SPINULOSA Reuss.

Plate 27, fig. 5.

*Verneuilina spinulosa* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 374, pl. 47, fig. 12.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 384, pl. 47, figs. 1-3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 55, figs. 88*a*, *b* (in text).

Typical specimens occur at the following localities: Vicinity of Romblon Island, China Sea; vicinity southern Luzon; vicinity of Marvel Bay, Borneo; east coast of Luzon, San Bernardino Strait to San Miguel Bay; Jolo Island and vicinity; north of Tawi Tawi; Sibuko Bay, Borneo, and vicinity; Gulf of Tomini, Celebes.

*Verneuilina spinulosa—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ; ° ′ ″ | | ° F. | | |
| U.S.N.M. | 9 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s......... | Common. |
| U.S.N.M. | 1 | D5284... | 13 42 06 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob.. | Rare. |
| U.S.N.M. | 1 | D5460... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Few. |
| U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 56.3 | fne. co. s...... | Rare. |
| U.S.N.M. | 2 | D5572... | 5 31 26 N.; 120 09 45 E.. | 324 | 52.3 | s............ | Rare. |
| U.S.N.M.<br>U.S.N.M. | 1<br>1 | D5580... | 4 52 45 N.; 119 06 46 E.. | 162 | 55.8 | br. s., Co..... | Rare. |
| U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 42.3 | gn. m........ | Rare. |
| | | D5601... | 1 13 10 N.; 126 17 05 E.. | 765 | ....... | s., glob., ptr. | Rare. |
| U.S.N.M. | 1 | D5637... | 3 53 20 S.; 128 48 00 E.. | 700 | ....... | gy. m........ | Rare. |

### VERNEUILINA TRIQUETRA (Münster.)

*Textularia triquetra* MÜNSTER, (in Römer), Neues Jahrb. für Min., 1838, p. 384, pl. 3, fig. 19.

*Textularia* (*Verneuilina*) *triquetra* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 11, 1863, p. 92.

*Verneuilina triquetra* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 383, pl. 47, figs. 18–20.

The only record for this species in the region is D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (635 meters), bottom temperature 44° F. (6.4° C.).

Brady records it from the Pacific in 210 and 255 fathoms (384 and 466 meters) off Kandavu, Fiji Islands.

*Verneuilina triquetra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44 | gy. m........ | |

### VERNEUILINA AFFIXA Cushman.

Plate 27, fig. 6.

*Verneuilina propinqua* H. B. BRADY (part), Rep Voy. *Challenger*, Zoology, vol. 9 1884, p. 387, pl. 47, figs. 13, 14 (not 8–12).—GOËS (part), Bull. Mus. Comp Zoöl., vol. 29, 1896, p. 38.

*Verneuilina affixa* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 56, figs 90, 91 (in text).

The only specimens of this species which were noted in the material examined were from D5650, Gulf of Boni, 540 fathoms (98 meters), bottom temperature, 40.1° F. (3.5° C.). They were of th form with the pointed apex and broad base.

*Verneuilina affixa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13278 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Rare. |

## Genus VALVULINA d'Orbigny, 1826.

### VALVULINA CONICA Parker and Jones.

Plate 27, fig. 7.

*Valvulina triangularis* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 2, vol. 1 1857, p. 295, pl. 11, figs. 15, 16 (not *Valvulina triangularis* d'Orbigny).

*Valvulina triangularis*, var. *conica* PARKER and JONES, Philos. Trans. Roy. Soc vol. 155. 1865, p. 406, pl. 15, fig. 27.

*Valvulina conica* M. **Sars**, Vid. Selsk. Forh., 1868, p. 249.—H. B. **Brady**, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 392, pl. 49, figs. 15, 16.—**Cushman**, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 58, figs. 93*a*, *b*, *c* (in text).

This has proved to be one of the commonest species in the whole region, and well distributed records for its occurrence have been obtained at about 50 stations. These range in depth from 24 to 1,560 fathoms (44 to 2,853 meters), but the great majority of these are between 250 and 500 fathoms (457 and 914 meters). Bottom temperatures range from 38.2° to 62.4° F. (3.4° to 16.8° C.), corresponding more or less with range of depth.

*Valvulina conica—Material examined.*

| | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m........ | Rare. |
| | | | D5241... | 6 50 45 N.; 126 14 38 E... | 215 | ....... | sft. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s .... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5369... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | bk. s........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m........ | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s......... | Rare. |
| | | | D5385... | 13 24 50 N.; 123 03 70 E... | 327 | 62.4 | gy. m........ | Frequent. |
| [illegible] | U.S.N.M. | 6 | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m........ | Few. |
| | | | D5429... | 9 41 30 N.; 118 50 22 E... | 766 | ....... | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 8 | D5447... | 13 28 00 N.; 123 46 18 E... | 310 | 45.3 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 5 | D5449... | 13 21 36 N.; 124 00 30 E... | 300 | ....... | ............. | Few. |
| [illegible] | U.S.N.M. | 2 | D5459... | | | | | |
| [illegible] | U.S.N.M. | 6 | D5460... | 13 32 30 N.; 123 58 06 E... | 565 | ....... | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 10+ | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m. (m. b.) | Common. |
| [illegible] | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 28 E... | 569 | ....... | gn. m........ | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. (net).. | Frequent. |
| [illegible] | U.S.N.M. | 5 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............ | Few. |
| [illegible] | U.S.N.M. | 6 | D5495... | 9 06 30 N.; 125 00 20 E... | 976 | 52.3 | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob.. | Few. |
| [illegible] | U.S.N.M. | 2 | D5538... | 9 08 15 N.; 123 15 20 E... | 256 | 53.3 | gn. m., s..... | Few. |
| [illegible] | U.S.N.M. | 4 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Few. |
| | | | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 10+ | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gn. m........ | Frequent. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 3<br>1 | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | ............. | Few. |
| [illegible] | U.S.N.M. | 10+ | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............. | Several. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 2<br>2 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Few. |
| | | | D5619... | 0 35 00 S.; 127 14 40 E... | 435 | ....... | fne. gy. s., m. | Few. |
| | | | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m..... | |
| [illegible] | U.S.N.M. | 10+ | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Frequent. |
| | | | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., bkr. sh ... | Few. |
| [illegible] | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 10+ | D5654... | 3 42 00 S.; 125 45 50 E... | 805 | 38.3 | ............. | Frequent. |
| [illegible] | U.S.N.M. | 10+ | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m........ | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m........ | Rare. |

### VALVULINA FUSCA (Williamson).

Plate 28, figs. 1*a*, *b*.

*Rotalina fusca* **Williamson**, Recent Foraminifera of Great Britain, 1858, p. 55, pl. 5, figs. 114, 115.

*Valvulina fusca* M. **Sars**, Vid. Selsk. Forh., 1868, p. 249.—H. B. **Brady**, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 392, pl. 49, figs. 13, 14.—**Cushman**, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 59, figs. 94, 95*a*, *b*, *c* (in text).

*Valvulina triangularis*, var. *austriaca* Parker and Jones, Introd. Foram., 1862, p. 311.

*Valvulina austriaca* H. B. Brady, Trans. Linn. Soc. London, vol. 24, 1864, p. 472.

This species is much less abundant than the preceding. It occurs at fewer stations and in fewer numbers. The range in depth is from 26 to 890 fathoms (48 to 1,628 meters); bottom temperature, from 38.3° to 53.3° F. (3.5° to 11.8° C.).

*Valvulina fusca—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | °F. | | |
| 13301 | U.S.N.M. | 1 | D5132... | Island off Panabutan Point, N. 15° W. 0.3 mile. | 26 | ....... | gn. m., s..... | Rare. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 13299<br>13300 | U.S.N.M. | 2 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s..... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s ........ | Rare. |
| | | | D5424... | 9 37 05 N.: 121 12 37 E... | 340 | 50.4 | co. s.......... | Rare. |
| 13303 | U.S.N.M. | 1 | D5446... | 8 48 44 N.; 123 27 35 E... | ...... | ....... | .............. | Few. |
| | | | D5469... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s..... | Rare. |
| 13302 | U.S.N.M. | 1 | D5523... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |
| 13304 | U.S.N.M. | 3 | D5538... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | .............. | Rare. |
| | | | D5582... | 4 43 50 N.; 121 23 24 E... | 700 | 38.7 | .............. | Rare. |
| 13298 | U.S.N.M. | 3 | D5591... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m........ | Rare. |
| 13297 | U.S.N.M. | 1 | D5651... | 13 36 48 S.; 123 38 24 E... | 500 | ....... | gn. m. (net.). | Rare. |

## Genus CHRYSALIDINA d'Orbigny, 1846.

### CHRYSALIDINA DIMORPHA H. B. Brady.

*Chrysalidina dimorpha* H. B. Brady, Quart, Journ. Micr. Sci., vol. 21, 1881, p. 54; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 388, pl. 46, figs. 20, 21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 60, figs. 96, 97*a*, *b* (in text).

A few specimens occurred at one station, D5152, off Tawi Tawi Group, Sulu Archipelago, 34 fathoms (62 meters), bottom temperature not recorded.

This is an Indo-Pacific species known to the eastward from the Hawaiian Islands, southward off Australia, and westward to the east coast of Africa, Madagascar, Mauritius, and the Kerimba Archipelago. Its northward range includes this record from the Sulu Sea and Brady's from Hongkong Harbor.

*Chrysalidina dimorpha—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s....... | Few. |

## Genus TRITAXIA Reuss, 1860.

### TRITAXIA TRICARINATA (Reuss).

Plate 28, figs. 2*a*, *b*.

*Textularia tricarinata* Reuss, Verst. Böhm. Kreid., pt. 1, 1845, p. 39, pl. 8, fig. 60.
*Tritaxia tricarinata* Reuss, Sitz. Akad. Wiss. Wien, vol. 40, 1860, p. 228, pl. 12, figs. 1, 2.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 389, pl. 49, figs. 8, 9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 61, figs. 98*a*, 99 (in text).

This species occurred at a number of stations in the region from the following localities: Vicinity of Pujada Bay; Gulf of Davao; China Sea, vicinity of Hongkong; China Sea, vicinity of Formosa; Mindoro Strait; Jolo Sea; and east coast of Luzon.

Some of the specimens are exceptionally fine and large.

The only *Challenger* record for this species is from off Raine Island, Torres Strait, 155 fathoms (283 meters).

*Tritaxia tricarinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | ° F. |  |  |
| [illegible] | U.S.N.M. | 10+ | D5244... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Common. |
| [illegible] | U.S.N.M. | 7 | D5247... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co..... | Common. |
| [illegible] | U.S.N.M. | 2 | D5301... | 6 52 05 N.; 126 14 15 E.. | 171 | ....... | gy. m....... | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 3 | D5318... | 7 02 00 N.; 125 38 45 E.. | 135 | ....... | m........... | Few. |
| [illegible] | U.S.N.M. | 1 | D5333... | 12 26 30 N.; 120 37 45 E.. | 310 | 73.8 | s............ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5425... | 9 37 45 N.; 121 11 00 E.. | 495 | 49.4 | gy. m., co. s. | Few. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net).. | Rare. |

### TRITAXIA INDISCRETA H. B. Brady.

Plate 28, fig. 3.

*Clavulina indiscreta* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 55.
*Tritaxia indiscreta* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 389, pl. 49, figs. 10, 11.

A specimen which closely agrees with Brady's figures of this species, both in character of the test and sutures, occurred at D5423, Jolo Sea, 508 fathoms (930 meters), bottom temperature, 49.8° F. (9.8° C.).

Brady's specimens were from *Challenger* station 174, off Kandavu, Fiji Islands, 210 fathoms (384 meters).

*Tritaxia indiscreta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | ° F. |  |  |
| [illegible] | U.S.N.M. | 1 | D5423... | 9 38 30 N.; 121 11 E..... | 508 | 49.8 | gy. m., co. s. | Rare. |

## Genus GAUDRYINA d'Orbigny, 1839.

### GAUDRYINA SCABRA H. B. Brady.

Plate 28, fig. 5.

*Gaudryina pupoides* H. B. Brady (not *G. pupoides* d'Orbigny, 1840), Ann. Mag Nat. Hist., ser. 4, vol. 6, 1870, p. 300, pl. 8, fig. 5.

*Gaudryina scabra* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p 381, pl. 46, fig. 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 62, fig 100*a*, *b*, 101 (in text).

Specimens of this species have occurred at numerous stations wel scattered throughout the region. The character of the test varie much, especially in the material of the included sponge spicules which are often entirely absent. In depth the stations vary fron 260 to 940 fathoms (476 to 1,719 meters). The bottom tempera tures, where recorded, vary from 36.7° to 44.0° F. (2.6° to 6.4° C.)

In the Archipelago the records are from the east coast of Luzon Southward it occurred off Darvel Bay and Sibuko Bay, Borneo north of Celebes; between Gillolo and Makyan Islands; and Macassa Strait.

*Gaudryina scabra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11774 | U.S.N.M. | 2 | D5439... | 15 58 15 N.; 119 40 20 E... | 940 | 36.7 | gn. m....... | Few. |
| 12701 | U.S.N.M. | 2 | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m....... | Few. |
| 14275 | U.S.N.M. | 6 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Few. |
| 11680 | U.S.N.M. | 4 | D5463... | 13 35 39 N.; 123 40 28 E... | 569 | ....... | gn. m.(m. b.) | Rare. |
| 14276 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | Rare. |
| 11679 | U.S.N.M. | 2 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | gn. m....... | Rare. |
| 14279 | U.S.N.M. | 2 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |
| 14280 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | Rare. |
| 11678 | U.S.N.M. | 6 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Few. |
| 14277 | U.S.N.M. | 3 | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | .............. | Few. |
| 12702 | U.S.N.M. | 3 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | .............. | Few. |
| 14278 | U.S.N.M. | 4 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Few. |
| 14274 | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. | Rare. |
| 11677 | U.S.N.M. | 7 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Frequent. |

### GAUDRYINA FLINTII Cushman.

Plate 29. fig. 1.

*Gaudryina subrotundata* Flint (not *G. subrotundata* Schwager, 1866), Rep. U. Nat. Mus., 1897 (1899), p. 287, pl. 33, fig. 1.

*Gaudryina rugosa* Goës (not *G. rugosa* d'Orbigny, 1840), Bull. Mus. Comp. Zoöl vol. 29, 1896, p. 39.

*Gaudryina flintii* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 63, fig 102*a*, *b*, *c* (in text).

Specimens of this species have occurred at stations in the followin localities: Jolo Sea; west coast of Luzon; vicinity of Darvel Ba Borneo; south of Patiente Strait; and Gulf of Boni.

The Philippine specimens belong to this species and are not unlik those figured by Flint, and is evidently of wide distribution.

*Gaudryina flintii—Material examined.*

| at. Na. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| | | | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5582... | 4 19 54 N.: 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m .... | Few. |
| [illegible] | U.S.N.M. | 5 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Common. |
| [illegible] | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | .............. | Rare. |

### GAUDRYINA QUADRANGULARIS Bagg.

Plate 29, fig. 2.

*Gaudryina quadrangularis* Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 133, pl. 5, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 64, figs. 103*a*, *b* (in text).

Several specimens of this species occurred at D5113, China Sea, off southern Luzon, 159 fathoms (290 meters), bottom temperature not recorded; D5381, Ragay Gulf, Luzon, 88 fathoms (161 meters), bottom temperature not recorded; D5469, east coast of Luzon, San Bernardino Strait to San Miguel Bay, 500 fathoms (914 meters), bottom temperature not recorded; D5569, north of Tawi Tawi, 303 fathoms (554 meters), bottom temperature 52.3° F. (10.1° C.); D5575, north of Tawi Tawi, 315 fathoms (579 meters), bottom temperature 52.3° F. (10.1° C.); the neighboring station, D5576, 277 fathoms (506 meters), bottom temperature 53.3° F. (11.8° C.); D5585, Sibuko Bay, Borneo, and vicinity, 476 fathoms (871 meters), bottom temperature 41.1° F. (5° C.).

Material has previously been known only from the vicinity of the Hawaiian Islands. It is a large species and not easily overlooked; therefore its distribution probably is not wide unless it has not previously been distinguished from other species.

*Gaudryina quadrangularis—Material examined.*

| at. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5113... | 13 48 22 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. (net). | Rare. |
| [illegible] | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s ........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5575... | 5 28 30 N.; 120 02 27 E... | 315 | 52.3 | Co., s....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............ | Rare. |
| [illegible] | U.S.N.M. | 5 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | Few. |

### GAUDRYINA TRIANGULARIS Cushman.

*Gaudryina triangularis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. figs. 104*a*, *b*, *c* (in text).

The only station at which this species occurred was D5212, east Masbate Island, 108 fathoms (198 meters); bottom temperatu 59.9° F. (15.5° C.).

The previous records for this species are off the Hawaiian Isla and off the Bonin Islands.

*Gaudryina triangularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m.... | .......... |

### GAUDRYINA PAUPERCULA Cushman.

Plate 29, figs. 4, 5.

*Gaudryina paupercula* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, *1911*, p. figs. 106*a*, *b* (in text).

At the following 11 stations specimens occurred which agree w with the type of the species: D5172, vicinity of Jolo, 318 fathor (582 meters), bottom temperature not recorded; D5424, Jolo Se 340 fathoms (622 meters), bottom temperature 50.4° F. (10.1° C D5425, Jolo Sea, 495 fathoms (906 meters), bottom temperatu 49.4° F. (9.7° C.); D5526, between Siquijor and Bohol Islands, 8 fathoms (1,472 meters), bottom temperature 52.3° F. (10.1° C D5569, north of Tawi Tawi, 303 fathoms (554 meters), botto temperature, 52.3° F. (10.1° C.); D5570, north of Tawi Tawi, 33 fathoms (604 meters), bottom temperature 52.3° F. (10.1° C D5571, north of Tawi Tawi, 340 fathoms (622 meters), bottom te perature 52.3° F. (10.1° C.); D5575, north of Tawi Tawi, 315 fatho (580 meters), bottom temperature 52.3° F. (10.1° C.); D5582, Da Bay, Borneo, 890 fathoms (1,628 meters), bottom tempera 38.3° F. (3.5° C.); D5584, Sibuko Bay, Borneo, 292 fathoms ( meters), bottom temperature 44.3° F. (6.8° C.); and D5639, lucca Sea, 1,560 fathoms (2,853 meters), bottom temperature recorded.

The material from the Philippines serves to more clearly fix as a very definite species. The short, broad form, arenaceous w with smooth surface, well finished, are very apparent. The colo usually gray or brownish, but at D5172 very typically shaped sp mens were found with tests of calcareous sand and white in color.

*Gaudryina pauperculaâ€”Material examined.*

| [illegible] | Coll. ofâ€” | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | Â° â€² â€³ Â° â€² â€³ | | Â° *F.* | | |
| [illegible] | U.S.N.M. | 4 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh ... | Few. |
| [illegible] | U.S.N.M. | 8 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn.m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5575 .. | 5 28 30 N.; 120 02 27 E... | 315 | 52.3 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 53 38 E... | 890 | 38.3 | gy.m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5584... | 4 17 40 N.; 118 57 42 E... | 292 | 44.3 | fne. s., gn.m. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m....... | Rare. |

### GAUDRYINA BRADYI Cushman.

Plate 29, fig. 3.

*Gaudryina pupoides* H. B. Brady (not *G. pupoides* d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 378, pl. 46, figs. 1-4.

*Gaudryina bradyi* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 67, figs. 107a-c (in text).â€”Pearcey, Trans. Roy. Soc. Edinburgh, vol. 49, 1914, p. 1014.

There are numerous stations for this species in the area varying in depth from 300 to 805 fathoms (549 to 1,472 meters); bottom temperature, where recorded, ranging from 41.2Â° to 56.4Â° F. (5.1Â° to 13.5Â° C.).

These stations include the following localities: Sogod Bay, southern Leyte; between Marinduque and Luzon; east coast of Mindanao; off northwestern Panay; eastern and southern Luzon; off Formosa; Palawan Passage; Jolo Sea; between Siquijor and Bohol Islands; Molucca Passage; and off Bouro Island. Pearcey, after examining *Challenger* material, affirms the separation of this species.

*Gaudryina bradyiâ€”Material examined.*

| [illegible] | Coll. ofâ€” | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | Â° â€² â€³ Â° â€² â€³ | | Â° *F.* | | |
| | | | D5201... | 10 10 00 N.; 126 04 15 E.. | 554 | 53.8 | gy. s., m.... | Rare. |
| | | | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5236 .. | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| | | | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 4 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s. br. Co..... | Frequent. |
| [illegible] | U.S.N.M. | 2 | | | | | | |
| [illegible] | U.S.N.M. | 5 | D5348... | 10 57 45 N.; 118 58 15 E.. | 375 | 56.4 | co. s ......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 46.0 | co. s ......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy.m.,co.s... | Rare. |
| | ...... | | D5446... | 12 43 64 N.; 124 59 18 E.. | 300 | ....... | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn.m., glob . | Few. |
| [illegible] | U.S.N.M. | 1 | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m...... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Rare. |

### GAUDRYINA BACCATA Schwager.

Plate 29, fig. 6.

*Gaudryina baccata* Schwager, *Novara*-Exped., Geol. Theil, pt. 2, 1866, p. 200, pl. 4, figs. 12*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 379, pl. 46, figs. 8–11.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 68, figs. 108*a*, *b* (in text).

Excellent specimens agreeing well with the figures given by Brady occurred at three stations: D5211, east of Masbate Island, 155 fathoms (283 meters), bottom temperature 56.6° F. (13.7° C.); D5586, vicinity Sibuko Bay, 347 fathoms (635 meters), bottom temperature 44.0° F. (6.4° C.); and D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

Brady recorded this species from a *Challenger* station, 206, in 2,100 fathoms (3,841 meters), between China and the Philippines.

*Gaudryina baccata—Material examined.*

| Cat. No | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13210 | U.S.N.M. | 1 | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s.... | Rare. |
| 13219<br>13220 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| 12706 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |

### GAUDRYINA CHILOSTOMA (Reuss).

*Textilaria chilostoma* Reuss, Zeitschr. deutsch. geol. Ges., vol. 4, 1852, p. 18.

*Gaudryina chilostoma* Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. 120, pl. 1, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 69, figs. 109*a*, *b* (in text).

*Gaudryina pupoides*, var. *chilostoma* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 379, pl. 46, figs. 5, 6.

*Gaudryina pupoides*, var. *chilostomella* Egger, Abh. kön. bay. Akad. Wiss. München, Cl. ii, vol. 18, 1893, p. 278, pl. 7, fig. 6 (?).

Fine typical specimens of this species occurred at three stations: D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (635 meters), bottom temperature 44.0° F. (6.4° C.), and D5592, Sibuko Bay, Borneo, 305 fathoms (558 meters), bottom temperature 43.3° F. (6.1° C.). Both this and the preceding species occurring at the same station, D5586, may raise the question as to whether or not these two are really distinct species.

*Gaudryina chilostoma—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12704 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| 12705 | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| 12703 | U.S.N.M. | 2 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m........ | Rare. |

### GAUDRYINA PSEUDOFILIFORMIS Cushman.

Plate 29, fig. 8.

*Gaudryina filiformis* H. B. Brady (not *G. filiformis* Berthelin), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 380, pl. 46, figs. 12*a*–*c*.

*Gaudryina pseudofiliformis* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 70, figs. 111*a*, *b* (in text).

Specimens of this species occurred at two stations: D5318, China Sea, vicinity Formosa, 340 fathoms (622 meters), bottom temperature not recorded; and D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (635 meters), bottom temperature 44.0° F. (6.4° C.).

Some of the specimens show very well the peculiar form of aperture figured.[14]

*Gaudryina pseudofiliformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12673 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 12672 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |

### GAUDRYINA APICULARIS Cushman.

Plate 29, fig. 7.

*Gaudryina siphonella* H. B. Brady (not *G. siphonella* Reuss, 1851), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 382, pl. 46, figs. 17–19.—Flint, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 288, pl. 34, fig. 2.

*Gaudryina apicularis* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 69, figs. 110*a*, *b* (in text).

This species occurred at station D5268, Verde Island Passage and Batangas Bay, 170 fathoms (311 meters), bottom temperature not given. It is even more like the figures in the *Challenger* Report than those given in Bulletin 71.

*Gaudryina apicularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |

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[14] Bull. 71, pt. 2, p. 70, fig. 111*a*.

### GAUDRYINA BACCATA Schwager.

Plate 29, fig. 6.

*Gaudryina baccata* Schwager, *Novara*-Exped., Geol. Theil, pt. 2, 1866, p. 2 pl. 4, figs. 12*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 18 p. 379, pl. 46, figs. 8–11.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. figs. 108*a*, *b* (in text).

Excellent specimens agreeing well with the figures given Brady occurred at three stations: D5211, east of Masbate Isla 155 fathoms (283 meters), bottom temperature 56.6° F. (13.7° C D5586, vicinity Sibuko Bay, 347 fathoms (635 meters), bottom te perature 44.0° F. (6.4° C.); and D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° (5.1° C.).

Brady recorded this species from a *Challenger* station, 206, 2,100 fathoms (3,841 meters), between China and the Philippines.

*Gaudryina baccata—Material examined.*

| Cat. No | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abund |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 13210 | U.S.N.M. | 1 | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s.... | Rare. |
| 13219<br>13220 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| 12706 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Rare. |

### GAUDRYINA CHILOSTOMA (Reuss).

*Textilaria chilostoma* Reuss, Zeitschr. deutsch. geol. Ges., vol. 4, 1852, p. 18.

*Gaudryina chilostoma* Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. pl. 1, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 69, figs. 109 (in text).

*Gaudryina pupoides*, var. *chilostoma* H. B. Brady, Rep. Voy. *Challenger*, Zoolo vol. 9, 1884, p. 379, pl. 46, figs. 5, 6.

*Gaudryina pupoides*, var. *chilostomella* Egger, Abh. kön. bay. Akad. W München, Cl. ii, vol. 18, 1893, p. 278, pl. 7, fig. 6 (?).

Fine typical specimens of this species occurred at three statio D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 mete bottom temperature 41.2° F. (5.1° C.); D5586, vicinity Sibuko B Borneo, 347 fathoms (635 meters), bottom temperature 44.0° (6.4° C.), and D5592, Sibuko Bay, Borneo, 305 fathoms (558 mete bottom temperature 43.3° F. (6.1° C.). Both this and the prec ing species occurring at the same station, D5586, may raise the qu tion as to whether or not these two are really distinct species.

*Gaudryina chilostoma—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | ° F. |  |  |
| [illegible] | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne.gy.s..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy.m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn.m....... | Rare. |

### GAUDRYINA PSEUDOFILIFORMIS Cushman.

Plate 29, fig. 8.

*Gaudryina filiformis* H. B. BRADY (not *G. filiformis* Berthelin), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 380, pl. 46, figs. 12*a*–*c*.

*Gaudryina pseudofiliformis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 70, figs. 111*a*, *b* (in text).

Specimens of this species occurred at two stations: D5318, China Sea, vicinity Formosa, 340 fathoms (622 meters), bottom temperature not recorded; and D5586, vicinity Sibuko Bay, Borneo, 347 fathoms (635 meters), bottom temperature 44.0° F. (6.4° C.).

Some of the specimens show very well the peculiar form of aperture figured.[14]

*Gaudryina pseudofiliformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | ° F. |  |  |
| [illegible] | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy.m....... | Rare. |

### GAUDRYINA APICULARIS Cushman.

Plate 29, fig. 7.

*Gaudryina siphonella* H. B. BRADY (not *G. siphonella* Reuss, 1851), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 382, pl. 46, figs. 17–19.—FLINT, Ann. Rep. U. S. Nat. Mus., 1897 (1899), p. 288, pl. 34, fig. 2.

*Gaudryina apicularis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 69, figs. 110*a*, *b* (in text).

This species occurred at station D5268, Verde Island Passage and Batangas Bay, 170 fathoms (311 meters), bottom temperature not given. It is even more like the figures in the *Challenger* Report than those given in Bulletin 71.

*Gaudryina apicularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | ° F. |  |  |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |

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[14] Bull. 71, pt. 2, p. 70, fig. 111*a*.

### GAUDRYINA ATTENUATA Cushman.

Plate 30, fig. 4.

*Gaudryina attenuata* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 636, 80, fig. 3.

*Description.*—Test elongate, composed of numerous chamb early portion triserial, triangular in cross section with sharp angl biserial chambers numerous, nearly as high as broad, in later dev opment each chamber running nearly or quite to the opposite side the test; wall rough, composed or rough sand grains and spo spicules roughly cemented, aperture at first textularian, becom more nearly circular in the last-formed chambers; color light gray Length about 3 mm.

*Type specimen.*—(Cat. No. 8508, U.S.N.M.) from *Albatross* stat D5259, off northwestern Panay, 312 fathoms (571 meters).

This species differs from *G. filiformis* Berthelin in its sharply angular basal portion and in its more loosely biserial form, as well the form of the aperture. It differs from *G. pseudofiliformis* Cu man in the aperture, the very rough surface, and more loos biserial character. The apertural end tends to become more att uate, but not to assume a clavuline character.

The species has been found at two other stations in the region follows: D5586, Sibuko Bay, Borneo, 347 fathoms (635 meters); ar D5592, the neighboring station, 305 fathoms (558 meters).

*Gaudryina attenuata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 8508<br>12696 | U.S.N.M. | 5 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy.m.,glob.. | Few. |
| 12695 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy.m........ | Rare. |
| 13261 | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gy.m........ | Rare. |

### GAUDRYINA ROBUSTA Cushman.

Plate 30, figs. 1*a*–*c*.

*Gaudryina robusta* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 636, pl. fig. 2.

*Description.*—Test large, stout, early portion sharply triangul triserial, later chambers biserial, rounded; wall made up of fine sa grayish in color, with numerous black specks; surface somewh rugose, sutures slightly depressed, sides of early portion somewh concave; aperture textularian, in a rather deep reëntrant of th inner border of the chamber.

Length 4 mm.; breadth 2 mm.

*Type specimen.*—(Cat. No. 8509, U.S.N.M.) from *Albatross* station D5612, Gulf of Tomini, Celebes, 750 fathoms (1,371 meters).

This is a large species, very robustly built, the early portion concavely triangular, the latter portion very much rounded. The specimen figured shows but a few of the biserial chambers.

The species has also occurred at D5637, south of Bouro Island, 700 fathoms (1,280 meters), and D5670, Macassar Strait, 1,181 fathoms (2,160 meters). Bottom temperature was recorded in the last case only—38.2° F. (3.4° C.).

*Gaudryina robusta—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 4 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy.m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5670... | 1 19 00 S.; 118 43 00 E... | 1,181 | 38.2 | gy.m........ | Rare. |

## Genus TRITAXILINA Cushman, 1911.

### TRITAXILINA CAPERATA (H. B. Brady).

Plate 28, figs. 4*a*, *b*.

*Clavulina caperata* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 54.

*Tritaxia caperata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 390, pl. 49, figs. 1-7.

*Tritaxilina caperata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 71, figs. 112-113 (in text).

Excellent specimens showing the typical adult condition as given in Brady's figures, and broken ones showing the radiating labyrinthian portion of the interior, occurred at five stations: D5244, vicinity of Pujada Bay, 171 fathoms (313 meters), bottom temperature not recorded; D5261, off southeastern Mindoro, 145 fathoms (265 meters), bottom temperature not recorded; D5241, Pujada Bay and vicinity, 215 fathoms (393 meters), bottom temperature not recorded; D5277, China Sea, vicinity southern Luzon, 80 fathoms (146 meters), bottom temperature 58.6° F. (14.7° C.); and D5318, China Sea, vicinity Formosa, 340 fathoms (622 meters), bottom temperature not recorded. Brady records the species off the Philippine Islands in 95 fathoms (173 meters); and off Kandavu, Fiji Islands, 250 fathoms (457 meters).

*Tritaxilina caperata—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 2 | D5241... | 6 50 45 N.; 126 14 38 E.. | 215 | ....... | sft. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 7 | D5244... | 6 52 05 N.; 126 14 15 E.. | 171 | ....... | gy. m....... | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5261 .. | 12 30 56 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 5 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co... | Few. |

## Genus CLAVULINA d'Orbigny, 1826.

### CLAVULINA COMMUNIS d'Orbigny.

Plate 31, fig. 1.

*Clavulina communis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 268; Foram. Fos Vienne, 1846, p. 196, pl. 12, figs. 1, 2.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 394, pl. 48, figs. 1-13.—CUSHMAN, Bull. 71, U. S. Nat Mus., pt. 2, 1911, p. 72, figs. 115-117 (in text).

*Verneuilina communis* JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860 p. 303.

This species is common and rather widely distributed in the region The specimens vary in numerous details. The color of the wall varie from a chalky white to a dark gray, is usually smooth, and occasionall somewhat roughened. Some of the specimens show excellentl the change from a triserial through the biserial to the final uniseria arrangement of the chambers. Occasional specimens show well th external tubular aperture. Although not definitely worked ou there seem to be indications of both microspheric and megalospheri forms of the species in the material, from the comparative size of th earlier chambers and the considerable difference in size of the adults

The species occurs at a large number of stations in the region varying in depth from 50 to 1,560 fathoms (91 to 2,853 meters), most of th stations being in the neighborhood of 300 fathoms (549 meters), bottom temperatures ranging from 38.2° to 76.3° F. (3.4° to 24.6° C.), and at the single shallow water station, 50 fathoms (91 meters), th temperature was 76.3° F. (24.6° C.). Specimens, however, were common at this last station.

*Clavulina communis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14306 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| | | | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3. | fne. gy. s..... | Common. |
| 12962 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Rare. |
| 14298 | U.S.N.M. | 9 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Common. |
| 12954<br>12960 | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gn. m., glob.. | Common. |
| 14291 | U.S.N.M. | 4 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s..... | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Rare. |
| 12959 | U.S.N.M. | 9 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co... | Common. |
| 14304 | U.S.N.M. | 8 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s........ | Few. |
| 14305 | U.S.N.M. | 1 | D5371... | 13 49 40 N.; 121 40 15 E.. | 83 | ....... | gn. m.(m.b.) | Rare. |
| 14293 | U.S.N.M. | 9 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | ....... | gn. n........ | Common. |
| 14292 | U.S.N.M. | 1 | D5468 .. | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m.(m.b). | Rare. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net). | Rare. |
| 12958 | U.S.N.M. | 1 | D5521... | 8 47 00 N.; 123 22 30 E.. | 221 | 53.3 | fne. s........ | Rare. |
| 14294 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............. | Rare. |
| 14295 | U.S.N.M. | 5 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Few. |
| 14307 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Rare. |
| 14301 | U.S.N.M. | 4 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Few. |
| 14303 | U.S.N.M. | 1 | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............ | Rare. |
| 14296 | U.S.N.M. | 1 | D5572 .. | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |
| 12956 | U.S.N.M. | 6 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Few. |
| 14216 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Rare. |
| | | | D5623... | 0 16 30 N.; 127 30 00 E.. | 272 | ....... | fne. s., m.... | Rare. |
| 14300 | U.S.N.M. | 1 | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s. | Rare. |
| 14299 | U.S.N.M. | 1 | D5637... | 3 53 20 S., 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |
| 14302 | U.S.N.M. | 9 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gn. m....... | Common |
| 14297 | U.S.N.M. | 3 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Few. |
| | | | D5660... | 5 36 30 S.; 120 40 00 E.. | 692 | 39.2 | gy. m., s..... | Rare. |
| 12963 | U.S.N.M. | 2 | D5670... | 1 19 00 S.; 118 43 00 E.. | 1,181 | 38.2 | gy. m....... | Rare. |
| | | | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob.. | Few. |

### CLAVULINA BRADYI Cushman.

Plate 31, fig. 4.

*Clavulina cylindrica* H. B. Brady (not *C. cylindrica* d'Orbigny, 1826), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 396, pl. 48, figs. 32–38.

*Clavulina bradyi* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 73, figs. 118*a*, *b*, 119 (in text).

At two stations specimens referable to this species occurred: D5300, China Sea, vicinity southern Luzon, 265 fathoms (484 meters); and D5642, Buton Strait, 37 fathoms (68 meters); bottom temperatures not recorded in either case.

Numerous specimens of this species occurred at a number of stations ranging in depth from 37 to 375 fathoms (68 to 686 meters), with bottom temperatures from 52.3° to 58.6° F. (10.1° to 14.7° C.). A large series was obtained at some stations showing excellent apertures with one, two, or more teeth, yet the structure of the early portion of the test shows that they are not *Haplostiche dubia*, which they in some ways resemble.

*Clavulina bradyi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F*. | | |
| 12996<br>12291 | U.S.N.M. | 7 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Few. |
| 12965 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 12392 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s...... | Rare. |
| 14096 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | .............. | Rare. |
| 12383 | U.S.N.M. | 2 | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............ | Rare. |
| 12364 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| 12380 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Rare. |
| 14089 | U.S.N.M. | 3 | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m....... | Few. |

### CLAVULINA ANGULARIS d'Orbigny.

Plate 31, fig. 3.

*Clavulina angularis* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 268, pl. 12, fig. 7.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 396, pl. 48, figs. 22–24.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 74, figs. 120–122*a*, *b* (in text).

*Valvulina angularis* Jones and Parker, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 305.

*Valvulina triangularis* d'Orbigny, forma *clavulina* Goës, Kongl. Svensk. Vet. Akad. Handl., vol. 19, No. 4, 1882, p. 86, pl. 11, figs. 387–389.

Excellent specimens of this species occurred in the following regions: Vicinity of Jolo; China Sea off southern Luzon; China Sea, vicinity Hongkong; north of Tawi Tawi Group; vicinity Sibuko Bay, Borneo; Jolo Island and vicinity.

*Clavulina angularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13146 | U.S.N.M. | 5 | D5172 | 6 03 15 N.; 120 35 30 E. | 318 | ...... | fne. s., sh | Few. |
| 13145 | U.S.N.M. | 10+ | D5276 | 13 49 15 N.; 120 14 45 E. | 18 | ...... | sh., p., s | Frequent. |
| 13144 | U.S.N.M. | 1 | D5315 | 21 40 00 N.; 116 58 00 E. | 148 | 54.4 | s., sh | Rare. |
| 13147 | U.S.N.M. | 1 | D5549 | 6 01 15 N.; 120 44 20 E. | 263 | 52.3 | s., glob., for. | Rare. |
| 12975 | U.S.N.M. | 1 | D5576 | 5 25 56 N.; 120 03 39 E. | 277 | 53.3 | s | Rare. |
| 13148 | U.S.N.M. | 1 | D5592 | 4 12 44 N.; 118 27 44 E. | 305 | 43.3 | gn. m | Rare. |
| 12974 | U.S.N.M. | 2 | D5569 | 5 33 15 N.; 120 15 30 E. | 303 | 52.3 | co. s | Rare. |

### CLAVULINA PARISIENSIS d'Orbigny.

Plate 19, fig. 4.

*Clavulina parisiensis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 268; Modèles, 1826, No. 66.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 395, pl. 48, figs. 14–18.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 75. figs. 123–124 (in text).

*Valvulina parisiensis* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, pp. 29, 35, pl. 1, fig. 26.

Specimens occur at several stations varying in depth from 80 to 554 fathoms (146 to 1,012 meters), with bottom temperatures from 44.3° to 59.° F. (6.8° C. to 15° C.). The specimens are of the slender form figured by Brady (pl. 48, figs. 17, 18), but specimens also occur with very rough exterior like those on plate 48, figures 14 to 16. There do not seem to be any connecting variations between these two forms as far as the material available shows.

*Clavulina parisiensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14218 | U.S.N.M. | 1 | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m | Rare. |
| 12968 | U.S.N.M. | 1 | D5277 | 13 56 55 N.; 120 13 45 E. | 80 | 58.6 | fne. s | Few. |
| 13149 | U.S.N.M. | 1 | D5291 | 13 29 40 N.; 121 00 45 E. | 173 | 51.5 | fne. bk. s | Rare. |
| 12967 | U.S.N.M. | 10+ | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | Co., s | Frequent. |
| | | | D5420 | 9 49 35 N.; 123 45 00 E. | 127 | 59.0 | .......... | Few. |
| | | | D5423 | 9 38 30 N.; 121 11 00 E. | 508 | 49.8 | gy. m., co. s. | Few. |
| 12758 | U.S.N.M. | 1 | D5523 | 8 48 44 N.; 123 27 35 E. | ...... | ...... | .......... | Rare. |
| | | | D5551 | 5 54 48 N.; 120 44 24 E. | 193 | 53.3 | fne. s | Rare. |
| 14308 | U.S.N.M. | 1 | D5565 | 5 51 42 N.; 120 30 30 E. | 243 | 52.3 | s., ptr., sh | Rare. |
| 13150 | U.S.N.M. | 2 | D5590 | 4 10 50 N.; 118 39 35 E. | 310 | 44.3 | gn. m., s | Rare. |

### CLAVULINA DIFFORMIS (H. B. Brady).

Plate 31, figs. 2*a*, *b*.

*Clavulina angularis* D'ORBIGNY, var. *difformis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 396, pl. 48, figs. 25–31.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 637, pl. 48, figs. 20–22.

The only record in the material dredged by the *Albatross* on this cruise which contains this species came from Apra Bay, Guam.

The specimens are quadrilateral, with an aperture like that figured by Brady.

Brady describes this as a variety of *angularis* from a single locality, Nares Harbor, Admiralty Island, in 17 fathoms (30 meters), in this same faunal region. The occurrence of this same form at Guam would indicate that this is something more than a casual variation, and it is here raised to specific rank.

Heron-Allen and Earland record this from a single station in the Kerimba Archipelago, off the southeastern coast of Africa, in water of 4 fathoms (7 meters) or less on inshore reefs.

This is a peculiar distribution at these widely isolated points, and it will be interesting to see how they are later filled in by future work.

*Clavulina difformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 1315 | U.S.N.M. | 1 | .......... | Apra Bay, Guam......... | ....... | ....... | ............... | Rare. |

### CLAVULINA ROTUNDATA Cushman.

Plate 30, figs. 8*a*, *b*.

*Clavulina rotundata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 635, pl. 79, fig. 3.

*Description.*—Test of comparatively few chambers, tapering apertural end broadly rounded, early portion triserial and conical, followed by two or three chambers biserially arranged, and the last-formed chambers uniserial; wall thick, composed of fine sand grains with a dark reddish-brown cement; smooth; aperture terminal, large and rounded, depressed, without a neck; color reddish-brown. Length 2.5–3 mm.

*Type specimen.*—Cat. No. 8506, U.S.N.M, from *Albatross* station D5512, off northern Mindanao, 445 fathoms (814 meters).

It is not uncommon at this and other stations.

This species is much shorter than most other species of the genus, broadly rounded at the apertural end, the wall thick and resembling that found in *Hormosina* and some species of *Trochammina*, *Ammodiscus*, etc. The aperture, instead of having a neck, shows rather the lack of it, the actual opening into the last-formed chamber being in a slight depression.

It has also occurred at *Albatross* station D5388, between Burias and Luzon, 226 fathoms (414 meters), bottom temperature 51.4° F. 10.7° C.); and D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.).

*Clavulina rotundata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12973 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few |
| 12971 | U.S.N.M. | 1 | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m.... | Rare. |
| 8506<br>12972 | U.S.N.M. | 5 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy., m., fne. s. | Few. |

### CLAVULINA PRIMAEVA Cushman.

Plate 30, figs. 2*a*, *b*, 3, 5–7.

*Clavulina primaeva* CUSHMAN, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 635, pl. 80, figs. 4, 5.

*Description.*—Test elongate, cylindrical, slender, composed of numerous chambers; early portion triserial, median portion biserial, terminal portion uniserial; chambers high; wall thick, light gray in color, smooth, sutures slightly depressed; aperture small, with a slight neck, more marked in the young stages.

Length about 3 mm.

*Type specimen.*—(Cat. No. 8507, U.S.N.M.) from *Albatross station* D5585, vicinity of Sibuko Bay, Borneo, 476 fathoms (871 meters).

This species is peculiar in the retarded taking on of the typical uniserial character of chamber arrangement and in the length of time that the biserial condition is held. In this it is distinctly primitive, much more so than in any other known species. The early triserial condition, on the other hand, is not much longer held than in some other species of the genus. The figure of a young specimen shows the typical clavuline neck even while the biserial condition is still held.

The species also occurred at D5526, between Siquijor and Bohol Islands, in 805 fathoms (1,472 meters).

*Clavulina primaeva—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12970 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.... | 805 | 52.3 | gn. m., glob. | Rare. |
| 8507 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.... | 476 | 41.1 | gn. m....... | Rare. |

## Subfamily BULIMININAE.

### Genus BULIMINA d'Orbigny, 1826.

#### BULIMINA ELEGANS d'Orbigny, var. EXILIS H. B. Brady.

*Bulimina elegans* D'ORBIGNY, var. *exilis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 399, pl. 50, figs. 5, 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 82, figs. 135*a–c* (in text).

A single typical specimen of this variety occurred at D5301, China Sea, vicinity Hongkong, 208 fathoms (381 meters), bottom temperature 50.5° F. (10.2° C.).

*Bulimina elegans*, var. *exilis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ° ′ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 N.; 115 43 E........ | 208 | 15.5 | gy. m....... | Rare. |

#### BULIMINA MARGINATA d'Orbigny.

*Bulimina marginata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 4, pl. 12, figs. 10-12.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 405, pl. 51, figs. 3-5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 83, figs. 136a, b (in text).

*Bulimina pupoides*, var. *marginata* WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 62, pl. 5, figs. 126, 127.

*Bulimina presli*, var. *marginata* PARKER and JONES, Philos. Trans., Roy. Soc., vol. 155, 1865, p. 372, pl. 15, fig. 10; pl. 17, fig. 70.

Apparently this species is not common in the region, occurring at but four stations: D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5622, between Gillolo and Makyan Islands, 275 fathoms (503 meters); D5655, Gulf of Boni, 608 fathoms (1,112 meters), bottom temperature 39.2° F. (4.3° C.); and D5618, Molucca Passage, 417 fathoms (763 meters), bottom temperature not recorded.

*Bulimina marginata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Rare. |
| | | | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m....... | |
| [illegible] | U.S.N.M. | ? | D5622... | 0 19 20 N.; 127 28 30 E.. | 275 | ....... | gy. m....... | |
| | | | D5655... | 3 34 10 S.; 120 50 30 E.. | 608 | 39.2 | g. m., fne. s.. | |

### BULIMINA INFLATA Seguenza.

Plate 31, fig. 6.

*Bulimina inflata* SEGUENZA, Atti Accad. Gioenia Sci. Nat., ser. 2, vol. 18, 1862, p. 109, pl. 1, fig. 10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 406, pl. 51, figs. 10–13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 84, figs. 137*a*, *b* (in text).

This species is fairly common in the region and well distributed. The stations range in depth from 195 to 805 fathoms (356 to 1,472 meters), and the bottom temperatures from 40.6° to 52.8° F. (4.7° to 11.5° C.). In the southern portion of the area it was found at D5590, vicinity of Sibuko Bay, Borneo, 310 fathoms (567 meters); D5652, Gulf of Boni, 525 fathoms (927 meters); and D5666, Macassar Strait, 272 fathoms (498 meters).

*Bulimina inflata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14315 | U.S.N.M. | 1 | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ..... | ............... | Rare. |
| 14314 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| 12548 | U.S.N.M. | 3 | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn. m....... | Few. |
| 12554 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| | | | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Common. |
| | | | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Frequent. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Frequent. |
| 12551 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| 14313 | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Rare. |
| 14316 | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | Co., s....... | Rare. |
| 12547<br>12552 | U.S.N.M. | 3<br>2 | D5326... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.8 | gn. m., glob. | Rare. |
| 12555 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Rare. |
| 14311 | U.S.N.M. | 1 | D5565... | 5 51 42 N.; 120 30 30 E.. | 243 | 52.3 | s., ptr., s.... | Rare. |
| 14312 | U.S.N.M. | 2 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m....... | Few. |
| 12553 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Few. |
| 14914 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 123 03 45 E.. | 221 | ....... | gy. m., glob. | Rare. |
| 12549 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |

### BULIMINA BUCHIANA d'Orbigny.

*Bulimina buchiana* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 186, pl. 11, figs. 15–18.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 407, pl. 51, figs. 18, 19.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 85, figs. 138*a*, *b*, (in text).

*Bulimina presli*, var. *buchiana* PARKER and JONES, Philos. Trans., Roy. Soc. vol. 155, 1865, p. 374, pl. 17, fig. 71.

This species occurred at only one station—D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature, 47.5° F. (8.6° C.).

*Bulimina buchiana—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12578 | U.S.N.M. | 3 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

### BULIMINA ACULEATA d'Orbigny.

Plate 31, fig. 5.

*Polymorpha pineiformis* Soldani, Testaceographica, vol. 1, pt. 2, 1791, p. 118, pl. 127, fig. 1; pl. 130. fig. vv.

*Bulimina aculeata* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 269.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 406, pl. 51, figs. 7-9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 286, figs. 139*a*, *b* (in text).

*Bulimina pupoides*, var. *spinulosa* Williamson, Recent Foraminifera of Great Britain, 1858, p. 62, pl. 5, fig. 128.

*Bulimina presli*, var. *aculeata* Parker and Jones, Introd. Foram., 1862, Appendix, p. 311.

This is the most common species of the genus in the region, the stations ranging in depth from 83 to 834 fathoms (151 to 1,525 meters), and the bottom temperature from 39.2° to 53.6° F. (4° to 12° C.) In the southern portion of the region it occurred at D5606, Gulf of Tomini, Celebes, 834 fathoms (1,525 meters); D5613, north of Celebes, 752 fathoms (1,375 meters); and D5655, Gulf of Boni, 608 fathoms (1,112 meters) bottom temperature 39.2° F. (4° C.).

*Bulimina aculeata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 1250 | U.S.N.M. | 2 | D5114... | 13 38 11 N.; 120 45 26 E.. | 340 | ....... | fne. s......... | Rare. |
| 1427 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn.m., s..... | Rare. |
| 1426 | U.S.N.M. | 10+ | D5112 .. | 13 38 42 N.; 120 47 25 E.. | 177 | 52.4 | dk.gn.m..... | Frequent. |
| | | | D5122... | 13 21 30 N.; 120 30 33 E.. | 220 | ....... | gn.m......... | Frequent. |
| 1428 | U.S.N.M. | 2 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft.gn.m..... | Few. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn.m......... | Occasional. |
| 1254 | U.S.N.M. | 4 | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft.gn.m..... | Frequent. |
| 1256 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s., m...... | Frequent. |
| 1424 | U.S.N.M. | 9 | D5216... | 12 52 00 N.; 123 23 30 E.. | 215 | 51.9 | gn. m......... | Frequent. |
| | | | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn.m......... | Frequent. |
| 1238 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn.m......... | Rare. |
| [illegible]<br>1425 | U.S.N.M. | 7 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.3 | gn.m......... | Frequent. |
| | | | D5238... | 7 34 45 N.; 126 28 15 E.. | 380 | 43.0 | gn.m......... | Few. |
| [illegible] | U.S.N.M. | 2 | D5250... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy.m., glob.. | Few. |
| [illegible] | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | Co., s......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn.m., s..... | Frequent. |
| [illegible] | U.S.N.M. | 5 | D5371... | 13 49 40 N.; 121 40 15 E.. | 83 | ....... | gn.m.(m.b.). | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy.m., fne.s.. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5606... | 0 16 28 N.; 121 33 30 E.. | 834 | ....... | gn.m......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy.m......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gn.m......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5655... | 3 34 10 S.; 120 50 30 E.. | 608 | 39.2 | gy.m., fne.s.. | Rare. |
| | | | H4806... | 7 43 45 N.; 122 08 45 E.. | 221 | ....... | gy.m., glob.. | Few. |

### BULIMINA PUPOIDES d'Orbigny.

Plate 31, fig. 8.

*Bulimina pupoides* d'Orbigny, Foram. Foss. Vienne, 1846, p. 185, pl. 11, figs. 13, 14.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 15*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 80, figs. 132*a* -*c* (in text).

This is a widely distributed species according to published records. has been noted at 13 stations in the area ranging from 232 to 805 fathoms (425 to 1,472 meters). Bottom temperatures were recorded from 10 of these stations, ranging from 40.1° to 52.8° F. (3.5° to 11.5° C.). The stations are off southeastern Mindoro; off Jolo; north of Tawi Tawi; Gulf of Tomini, Celebes; and Sibuko Bay, Borneo.

Other North Pacific stations are about the Hawaiian Islands and Galapagos Islands.

*Bulimina pupoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13396 | U.S.N.M. | 6 | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ....... | ............... | Few. |
| 12584 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s.,m..... | Rare. |
| 12580<br>14352 | U.S.N.M.<br>U.S.N.M. | 3<br>3 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn.m.,s..... | Rare. |
| 14329 | U.S.N.M. | 8 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy.m.,s ..... | Common. |
| 12579 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn.m.,glob.. | Rare. |
| 14351 | U.S.N.M. | 1 | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s.,brk.,sh.... | Rare. |
| 12581 | U.S.N.M. | 3 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne.gys.,gy.m | Rare. |
| 14353 | U.S.N.M. | 10 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn.m.,s ..... | Common. |
| 12583 | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 38 20 E.. | 310 | 44.3 | gn.m.,s ..... | Rare. |
| 14354 | U.S.N.M. | 10 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy.m........ | Common. |
| 12582 | U.S.N.M. | 3 | D5650 .. | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn.m ....... | Few. |
| 14355 | U.S.N.M. | 10 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44 | gy.m........ | Common. |
| 14356 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |

### BULIMINA PYRULA d'Orbigny.

*Bulimina pyrula* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 184, pl. 11, figs. 9, 10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 399, pl. 50, figs. 7–10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 78, figs. 126*a*–*c* (in text).

There are 13 stations from which material was obtained. These range in depth from 208 to 805 fathoms (381 to 1,472 meters), the average 465 fathoms (850 meters). The 9 stations at which bottom temperature was recorded give a range from 38.3° F. to 53.8° F. (3.5° C. to 12° C.) with an average of 47° F. (8.3° C.).

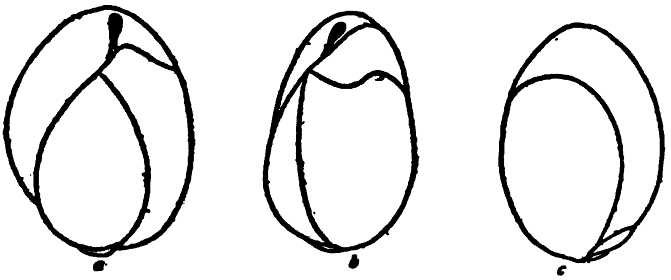


FIG. 1.—BULIMINA PYRULA D'ORBIGNY. × 50. FROM ALBATROSS STATION D5586. *a*–*c*. THREE VIEWS OF SAME SPECIMEN.

The distribution covers the following areas: Sogod Bay, southern Leyte; off northwestern Panay; east coast of Luzon; north of Tawi Tawi; Sibuko Bay, Borneo; Gulf of Tomini, Celebes; off Bouro Island; and Gulf of Boni.

The only other records in the North Pacific are those from the coast of Japan.

*Bulimina pyrula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 6 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 53.5 | gy.s.,m..... | Common. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy.m.,glob . | Rare. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy.m.,s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ....... | gy.m.,(m.b) | Rare. |
| [illegible] | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy.m.,fne.s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne.s.,glob.. | Rare. |
| [illegible] | U.S.N.M. | 9 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy.m......... | Common. |
| [illegible] | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne.gy.s..... | Rare. |
| [illegible] | U.S.N.M. | 9 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn.m.,s..... | Common. |
| [illegible] | U.S.N.M. | 9 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy.m......... | Common. |
| [illegible] | U.S.N.M. | 5 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy.m......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne.gy.s..... | Rare. |
| [illegible] | U.S.N.M. | 10 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | .............. | Common. |

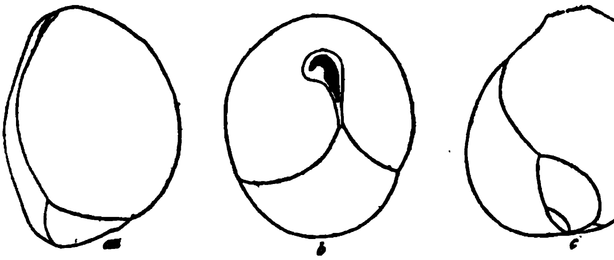


FIG. 1.—BULIMINA PYRULA D'ORBIGNY, VAR. PERVERSA CUSHMAN. × 50. FROM ALBATROSS STATION D5654. a–c. THREE VIEWS OF SAME SPECIMEN.

BULIMINA PYRULA d'Orbigny, var. PERVERSA, new variety.

*Description.*—Variety differing from the typical in the form which in the variety is broadest at the base, the initial end of the test hardly visible, successive chambers extending back to the initial end, whole test tapering to the broadly rounded apertural end; surface smooth and otherwise like the typical form of the species.

*Type specimen.*—(Cat. No. 14342, U. S. Nat. Mus.) from *Albatross* station D5591, in 260 fathoms (475 meters), Sibuko Bay, Borneo. Other localities are Sogod Bay, southern Leyte; between Marinduque and Luzon; east coast of Mindanao; between Negros and Siquijor; and the Gulf of Boni. These stations range in depth from 195 to 805 fathoms (356 to 1,472 meters), average 367 fathoms (672 meters). Bottom temperature of seven stations range from 38.3° F. to 53.5° F. (3.5° C. to 11.9° C.), with the average 47.3° F. (8.4° C.).

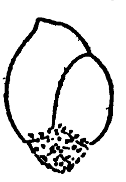


FIG. 3.—BULIMINA PYRULA D'ORBIGNY, VAR. SPINESCENS H. B. BRADY. × 50. FROM ALBATROSS STATION D5586.

This variety in this material is easily distinguished from the typical.

*Bulimina pyrula*, var. *perversa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12558 | U.S.N.M. | 1 | D5115... | 13 37 11 N.; 120 43 40 E. | 340 | ...... | ............... | Rare. |
| 12559 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m....... | Rare. |
| 14344 | U.S.N.M. | 2 | | | | | | |
| 14346 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E. | 195 | 52.8 | gn. m.......... | Rare. |
| 13395 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E. | 260 | 45.7 | fne. gy. s., gy. m. | Rare. |
| 14341 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E. | 254 | 53.5 | gn. m.......... | Rare. |
| 12556 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E. | 310 | 44.3 | gn. m., s........ | Rare. |
| 14342 | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 38 20 E. | 260 | ...... | ............... | Rare. |
| 12557 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E. | 700 | ...... | gy. m.......... | Rare. |
| 14345 | U.S.N.M. | 7 | D5654... | 3 42 00 S.; 120 45 50 E. | 805 | 38.3 | ............... | Common. |
| 14343 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E. | 494 | 41.2 | fne. gy. s....... | Few. |

### BULIMINA PYRULA d'Orbigny, var. SPINESCENS H. B. Brady.

*Bulimina pyrula* D'ORBIGNY, var. *spinescens* H. B. BRADY, Rep. Voy. *Challeng* Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 11, 12.—CUSHMAN, Bull. 71, U. S. Nat Mus., pt. 2, 1911, p. 78, figs. 128, 129 (in text).

The only material which can be referred to this variety is a singl specimen from *Albatross* station, D5586, Sibuko Bay, Borneo, 34 fathoms (635 meters), bottom temperature, 44° F. (6.4° C.); an D5638, south of Bouro Island, in 517 fathoms (946 meters). The are of the form which I figured from off Japan, and are somewha different in shape than that figured by Brady.

*Bulimina pyrula*, var. *spinescens*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14347 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m........ | Rare. |
| 12560 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s..... | Rare. |

### BULIMINA OVATA d'Orbigny.

*Bulimina ovata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 185, pl. figs. 13, 14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 400, pl. 50, figs. 13*a*, *b*.—CUSHMAN, Bull. 71, U. S. Na Mus., pt. 2, 1911, p. 77, figs. 125*a*–*c* (in text).

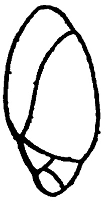


FIG. 4.—BULIMINA OVATA D'ORBIGNY. ×50. FROM ALBATROSS STATION D5469.

Specimens are rare at three stations all in 500 or mor fathoms (914 meters); D5201, Sogod Bay, southern Leyt in 554 fathoms (1,012 meters); D5469, east coast of Luzo in 500 fathoms (914 meters); and D5487, between Ley and Mindanao, in 732 fathoms (1,339 meters). They a also found at two other stations in 200 or more fatho (366 meters); D5216, between Burias and Luzon, 2 fathoms (393 meters); and D5591, Sibuko Bay, Borne 260 fathoms (476 meters).

This is a short species, in which even the last-formed chamber e tends back to near the initial end of the test.

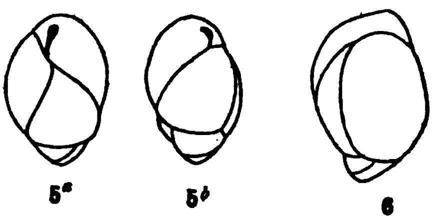
*Bulimina ovata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 53.8 | gy. s., m.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5216... | 12 52 00 N.; 123 23 30 E.... | 215 | 51.9 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.... | 500 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5487... | 10 02 45 N.; 125 05 33 E.... | 732 | 52.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 38 20 E.... | 260 | ....... | ............... | Rare. |

### BULIMINA AFFINIS d'Orbigny.

*Bulimina affinis* D'ORBIGNY, in De la Sagra, Hist. Fis. Nat. Pol. Cuba, 1839, "Foraminifères," p. 109, pl. 2, figs. 25, 26.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 400, pl. 50, figs. 14*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 79, fig. 130 (in text).

There are only four records for this species from all the material I have examined; D5114, Balayan Bay and Verde Island Passage, 340 fathoms (622 meters); D5214, east of Masbate Island, 218 fathoms (399 meters); D5526, between Siquijor and Bohol Islands, 805 fathoms (1,472 meters); and D5590, Sibuko Bay, Borneo, 310 fathoms (567 meters), at all stations. From other North Pacific records it seems to occur in deep water.



FIGS. 5, 6.—BULIMINA AFFINIS D'ORBIGNY. × 50. FROM ALBATROSS STATION D5114. 5*a*, *b*. TWO VIEWS OF SAME SPECIMEN. 6, ANOTHER SPECIMEN OF IRREGULAR SHAPE.

*Bulimina affinis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E.... | 340 | ....... | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5214... | 12 25 13 N.; 123 37 15 E.... | 218 | 51.4 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.... | 805 | 52.3 | gn. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.... | 310 | 44.3 | gn. m., s .... | Rare. |

### BULIMINA ELONGATA d'Orbigny.

*Bulimina elongata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 187, pl. 11, figs. 19, 20.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 401, pl. 51, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 79, figs. 131 *a-d* (in text).

The records for the region are two in the deeper water to the southward: D5613, Gulf of Tomini, Celebes, in 752 fathoms (1,375 meters), and D5654, Gulf of Boni, in 805 fathoms (1,472 meters) and two in the north, D5301, China Sea, vicinity Hongkong, 20 fathoms (381 meters), and D5529, between Siquijor and Boh Islands, 441 fathoms (812 meters). It was rather rare at all station The only other records for the North Pacific are off Japan.

*Bulimina elongata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12575 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.... | 208 | 50.5 | gy. m., s.... | Rare. |
| 12574 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.... | 441 | 53.0 | gy. m., glob.. | Rare. |
| 14360 | U.S.N.M. | 3 | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m....... | Rare. |
| 14361 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E.... | 805 | 38.3 | ............. | Rare. |

### BULIMINA SUBAFFINIS, new species.

*Description.*—Test fusiform, apical end sharply pointed, ape tural end with a rounded point, bases of chambers gradually appea ing somewhat above the ape the last-formed one extendi from the apertural end about three-fourths of the wa back on the test, surfa smooth, aperture a comm shaped slit with a tooth.

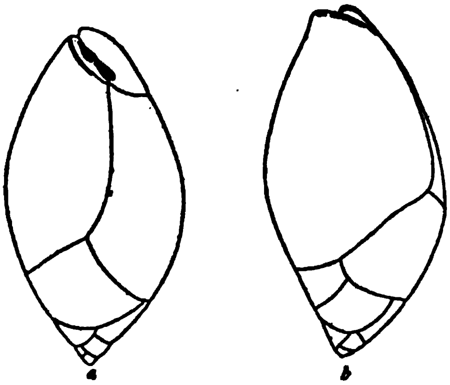


FIG. 7.—BULIMINA SUBAFFINIS, NEW SPECIES. VIEWS FROM DIFFERENT SIDES, × 100. FROM STATION D5201.

Length about 1 mm. slightly more.

*Type specimen.*—Cat. N 14330, U.S.N.M., from *Alb tross* station D5201, fro Sogod Bay, southern Leyte 554 fathoms (1,012 meters bottom temperature 53.8° (12.1° C.). It is also rare at D5639, Molucca Sea, in 1,560 fatho (2,853 meters).

This sharply pointed species seems very distinct from the ot species of the genus in the region.

*Bulimina subaffinis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14330 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 53.8 | gy. s., m.... | Rare. |
| 14331 | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E.... | 1,560 | ....... | gy. m....... | Rare. |

## Genus BULIMINELLA Cushman, 1911.

### BULIMINELLA SUBTERES (H. B. Brady).

*Bulimina presli*, var. *elegantissima* Parker and Jones, Philos. Trans., Roy. Soc., vol. 155, 1865, p. 374, pl. 15, figs. 12–17.

*Bulimina elegantissima* (var.) H. B. Brady, Ann. Mag. Nat. Hist., ser. 5, vol. 1, 1878, p. 436, pl. 21, fig. 12.

*Bulimina subteres* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 55; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 403, pl. 50, figs. 17, 18.

*Buliminella subteres* Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 89, figs. 142*a*, *b* (in text).

A single, generally typical specimen of this interesting species was obtained from D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.). This is the second record for the North Pacific for this species.

*Buliminella subteres—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |

### BULIMINELLA CONTRARIA (Reuss).

Plate 31, fig. 9.

*Rotalina contraria* Reuss, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 76, pl. 5, fig. 31.

*Bulimina contraria* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 409, pl. 54, figs. 18*a–c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 89, fig. 143 (in text).

Specimens of this species, very typical in every way, occurred at *Albatross* station D5236 in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.); D5349, in 730 fathoms (1,335 meters), Palawan Passage, bottom temperature 40.6° F. (4.7° C.); and D5618, in 417 fathoms (763 meters), Molucca Passage.

*Buliminella contraria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s ........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m....... | Rare. |

### BULIMINELLA ELEGANTISSIMA (d'Orbigny).

*Bulimina elegantissima* D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 51, pl. 7, fi 13, 14.—WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 6 pl. 5, figs. 134, 135.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 18 p. 402, pl. 50, figs. 20–22.

This widely distributed species has occurred but once in t Philippine material, from the station at which so many rare speci have been recorded—D5236, Pacific Ocean, east coast of Mindana in 494 fathoms (903 meters).

*Buliminella elegantissima—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12659 | U.S.N.M. | 1 | D5236... | 8 45 50 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |

## Genus VIRGULINA d'Orbigny, 1826.

### VIRGULINA SUBSQUAMOSA Egger.

*Virgulina subsquamosa* EGGER, Neues Jahrb., 1857, p. 295, pl. 12, figs. *19–21.* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 415, pl. 52, fi 9–11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 92, figs. 146*a*–c ( text).

At six stations specimens occurred which are referable to t species; D5115, Verde Island Passage, 340 fathoms (622 meter D5300, China Sea, vicinity southern Luzon, 265 fathoms (484 meter D5315, China Sea, vicinity Formosa, 148 fathoms (271 meter bottom temperature 54.4° F. (12.4° C.); D5529, between Siquij and Bohol Islands, 441 fathoms (812 meters), bottom temperatu 53.0° F. (11.7° C.); D5592, Sibuko Bay, Borneo, and vicinity, 30 fathoms (558 meters), bottom temperature 43.3° F. (6.1° C.); an D5638, south of Bouro Island, 517 fathoms (946 meters).

*Virgulina subsquamosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13363 | U.S.N.M. | 1 | D5115... | 13 37 11 N.; 120 43 40 E... | 340 | ....... | ............... | Rare. |
| 13365 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| 13364 | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh....... | Rare. |
| 13360 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53 | gy. m., glob. | Rare. |
| 13359 | U.S.N.M. | 2 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m....... | Rare. |
| 13361 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s.... | Rare. |

### VIRGULINA PAUCILOCULATA H. B. Brady.

*Virgulina pauciloculata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 414, pl. 52, figs. 4, 5.

The only station at which specimens referable to this species have occurred is D5526, between Siquijor and Bohol Islands, 805 fathoms (1,472 meters), bottom temperature 52.3° F. (10.1° C.).

This is a very rare species, described by Brady in the *Challenger* report from off New Guinea, Torres Strait, and the Ki Islands in 3-129 fathoms (5–236 meters). Little more is known of its distribution. Egger records it from several localities, but his figures, unless possibly in one case, do not represent the species. The one Philippine specimen was typical.

*Virgulina pauciloculata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.... | 805 | 52.3 | gn. m., glob. | Rare. |

### VIRGULINA SCHREIBERSIANA Czjzek.

*Virgulina schreibersiana* Czjzek, Haidinger's Nat. Abhandl., vol. 2, 1848, p. 147, pl. 13, figs. 18–21.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 414, pl. 52, figs. 1–3.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 291, pl. 37, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 94, figs. 148a, b (in text).

I have obtained specimens of this species from six stations as follows: H4898, Sulu Sea, off western Mindanao, 221 fathoms (425 meters), bottom temperature not recorded; D5112, China Sea, off southern Luzon, 177 fathoms (324 meters), bottom temperature 52.4° F. (10.2° C.); D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5523, northern Mindanao and vicinity, depth and temperature not recorded; D5529, between Siquijor and Bohol Islands, 441 fathoms (812 meters), bottom temperature 53° F. (6.5° C.); and D5120, Balayan Bay and Verde Island Passage, 393 fathoms (719 meters), bottom temperature 43.7° F. (6.5° C.).

*Virgulina schreibersiana—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5112... | 13 45 15 N.; 120 46 30 E... | 177 | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s.... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............... | Rare. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53 | gy. m., glob. | |
| [illegible] | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob. | Rare. |

### VIRGULINA CORNUTA Cushman.

Plate 32, figs. 3–6.

*Virgulina cornuta* Cushman, Proc. U. S. Nat. Mus., vol. 44, 1913, p. 637, pl. 8 fig. 1.

*Description.*—Test pointed at the initial end, broadly rounded the apertural end, whole test curved, irregularly biserial, last-forme chambers very tumid, aperture a comma-shaped opening with surrounding raised portion; wall thin and translucent, smooth.

Length about 0.8 mm.

*Type specimen.*—(Cat. No. 8510, U.S.N.M.) from *Albatross* statio D5284, China Sea, near southern Luzon, 422 fathoms (775 meters It has also occurred in typical form at D5112, China Sea, off southern Luzon, 177 fathoms (324 meters); D5114, in 340 fathoms (62 meters), off Verde Island Passage; D5201, Sogod Bay, souther Leyte, 554 fathoms (1,012 meters); and D5259, in 312 fathoms (57 meters), off northwestern Panay.

This species is peculiar in its horn-like shape, its very tumid las formed chambers, and tapering curved early portion.

*Virgulina cornuta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | 1 | D5112... | 13 48 22 N.; 120 47 25 E... | 177 | 52.4 | dk. gn. m.... | Rare. |
| 14201 | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E... | 340 | ....... | fne. s........ | Rare. |
| 13372 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Rare. |
| 14202 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob - | Rare. |
| 8510 | U.S.N.M. | 1 | D5284... | 13 42 05 N.; 120 30 45 E... | 422 | 42.3 | gy. m., glob. | Rare. |

### VIRGULINA SUBDEPRESSA H. B. Brady.

*Virgulina subdepressa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 188 p. 416, pl. 52, figs. 14–17.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. vol. 18, 1893, p. 291, pl. 8, fig. 103.—Goës, Bull. Mus. Comp. Zoöl., vol. 29, 189 p. 47.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 93, fig. 147 (in text

This species is only known from comparatively deep water, a therefore it is not expected in any quantity in the Philippine m terial. The only record is from *Albatross* station D5257, southe Mindanao, in 28 fathoms (52 meters) proving an exception to t general rule.

*Virgulina subdepressa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13371 | U.S.N.M. | 1 | D5257... | 7 12 12 N.; 124 12 15 E.... | 28 | ....... | m........... | Rare. |

## Subfamily CASSIDULININAE.

### Genus CASSIDULINA d'Orbigny, 1826.

### CASSIDULINA LAEVIGATA d'Orbigny.

Plate 31, fig. 7.

*Cassidulina laevigata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 282, pl. 15, figs. 4, 5; Modèles, 1826, No. 41.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 428, pl. 54, figs. 1–3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 96, figs. 150*a*, *b* (in text),

The only stations at which this species was noted were D5156, Sulu Archipelago, Tawi Tawi Group, 18 fathoms (33 meters), D5172, vicinity of Jolo, 318 fathoms (582 meters), and D5301, China Sea, vicinity Hongkong, 208 fathoms (381 meters), bottom temperature 50.5° F. (10.2° C.).

*Cassidulina laevigata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh.... | Rare. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m....... | Rare. |

### CASSIDULINA SUBGLOBOSA H. B. Brady.

Plate 32, fig. 2.

*Cassidulina subglobosa* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 60; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 430, pl. 54, figs. 17*a–c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 98, fig. 152 (in text).

At numerous stations well scattered over the region this species has occurred as follows: Balayan Bay and Verde Island Passage; Pacific Ocean; east coast of Mindanao; east coast of Luzon between San Bernardino Strait to San Miguel Bay; vicinity of Sibuko Bay, Borneo; between Gillolo and Makyan Islands; vicinity of Bouro Island; and in the Gulf of Boni.

There seem to be two well-defined forms of this species. The first of these is a form with few visible chambers, and similar to that figured by Brady in the *Challenger* Report (pl. 54, fig. 17); the other is a form with more numerous chambers and the apertural end broadly truncate and flattened, the aperture occupying the central portion. The latter form is found only in the region to the south and may represent a different species. A similar form is found off the coast of New Zealand.

*Cassidulina subgloboso—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14217 | U.S.N.M. | 2 | D5114... | 13 36 11 N.; 120 45 26 E... | 340 | ....... | fne. s........ | Rare. |
| | | | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | crs. s........ | Rare. |
| 13387 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 13381 | U.S.N.M. | 1 | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m............ | Rare. |
| 13389 | U.S.N.M. | 3 | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............ | Few. |
| 13384 | U.S.N.M. | 1 | D5443... | 12 43 05 N.; 125 01 00 E... | 241 | 51.3 | co. s., sh.... | Rare. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Rare. |
| 13386 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Rare. |
| 13388 | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. | Rare. |
| 13382 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m | Rare. |
| 13385 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |
| 13383 | U.S.N.M. | 1 | D5652... | 4 35 00 S.; 121 23 06 E... | 525 | 41.2 | gn. m....... | Rare. |

### CASSIDULINA CRASSA d'Orbigny.

*Cassidulina crassa* D'ORBIGNY, Foram. Amér. Mérid., 1839, p. 56, pl. 7, figs. 18-20; Foram. Foss. Vienne, 1846, p. 213, pl. 21, figs. 42, 43.—CUSHMAN, Bull. 71 U. S. Nat. Mus., pt. 2, 1911, p. 97, fig. 151 (in text).

There is a single specimen from D5300, China Sea off southern Luzon, which is characteristic.

*Cassidulina crassa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 13390 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |

## Genus EHRENBERGINA Reuss, 1850.

### EHRENBERGINA SERRATA Reuss.

*Ehrenbergina serrata* REUSS, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 377, pl. 48, fig. 7.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 434, pl. 55, figs. 2-7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 2, 1911, p. 101, figs. 155*a-d* (in text).

This species occurred at seven stations, most of them in the southern portion of the area. They were D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.); D5267, off Batangas Bay, 170 fathoms (300 meters), bottom temperature not recorded; D5300, China Sea, vicinity southern Luzon, 265 fathoms (484 meters), bottom temperature not recorded; D5576, north of Tawi Tawi Group, 277 fathoms (506 meters), bottom temperature 53.3° F. (11.8° C.); D5660, Flores Sea, 692 fathoms (1,266 meters), bottom temperature 39.2° F. (4.3° C.); D5637, off Bouro Island, 700 fathoms (1,280 meters); D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature 47.5° F. (8.6° C.).

*Ehrenbergina serrata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Few. |
| [illegible] | U.S.N.M. | 3 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy.m., s .... | Few. |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5267... | 13 42 20 N.; 120 58 25 E... | 170 | ....... | p., s., sh..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s.............. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m....... | Rare. |

# Family LAGENIDAE.

## Subfamily LAGENINAE.

### Genus LAGENA Walker and Boys, 1784.

**LAGENA GLOBOSA (Montagu).**

"*Serpula* (*Lagena*) *laevis globosa*" WALKER and BOYS, Test. Min., 1784, p. 3, pl. 1, fig. 8.

*Vermiculum globosum* MONTAGU, Test. Brit., 1803, p. 523.

*Lagena globosa* BROWN, Illus. Rec. Conch. Great Britain and Ireland, ed. 1, 1827, pl. 1, fig. 37; ed. 2, 1884, p. 126, pl. 56, fig. 37.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 452, pl. 56, figs. 1-3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 3, pl. 4, fig. 2.

This species occurred at several stations in the area: D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte Island, bottom temperature 52.8° F. (11.5° C.); D5268, in 170 fathoms (311 meters), off Batangas Bay; and D5666, in 272 fathoms (498 meters), off Celebes, bottom temperature 47.5° F. (8.6° C.).

*Lagena globosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 126 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | p., s., sh..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

**LAGENA LAEVIS (Montagu).**

"*Serpula* (*Lagena*) *laevis ovalis*" WALKER and BOYS, Test Min., 1784, p. 3, pl. 1, fig. 9.

*Vermiculum laeve* MONTAGU, Test. Brit., 1803, p. 524.

*Lagena laevis* WILLIAMSON, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 12, pl. 1, figs. 1, 2.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 455.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 5, pl. 1, fig. 3; pl. 38, fig. 5.

Occurrence of this species was noted in material from two *Alba-* ss stations in the Philippines—D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); and D5537, in 254 fathoms (464 meters) between Negros and Siquijor bottom temperature 53.5° F. (11.8° C.).

*Lagena laevis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13049 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 13050 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |

### LAGENA LAEVIGATA (Reuss).

*Fissurina laevigata* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 1.

*Lagena laevigata* Terrigi, Atti Accad. Pont. Nuovi Lincei, vol. 33, 1880, p. 177 pl. 1, fig. 6.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 473 pl. 114, figs. 8*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 7, pl. fig. 1.

The only records for the species in the Philippines are *Albatros* stations, D5172, in 318 fathoms (582 meters), vicinity of Jolo, an D5201, Sogod Bay, southern Leyte in 554 fathoms (1,012 meters) The species was found to be common in the deeper waters of th North Pacific and seems to be widely distributed elsewhere, but i was very rare in the material examined.

*Lagena laevigata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13052 | U.S.N.M. | 1 | D5172...<br>D5201 .. | 6 03 15 N.; 120 35 30 E..<br>10 10 00 N.; 125 04 15 E.. | 318<br>554 | .......<br>52.8 | fne. s., sh....<br>gy. s., m.... | Rare.<br>Rare. |

### LAGENA CLAVATA (d'Orbigny).

*Oolina clavata* d'Orbigny, Foram. Foss. Vienne, 1846, p. 24, pl. 1, figs. 2, 3.

*Lagena clavata* Mackie, Recreative Science, vol. 1, 1859, p. 148, fig. 13.—H. B Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456.—Cushman, Bul 71, U. S. Nat. Mus., pt. 3, 1913, p. 9, pl. 2, fig. 3.

This species was noted from two stations, *Albatross* D5114, i 340 fathoms (622 meters), Verde Island Passage and D5537, in 25 fathoms (464 meters), between Negros and Siquijor, bottom tempe ature 53.5° F. (11.8° C.).

*Lagena clavata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E.. | 340 | ....... | fne.s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |

### LAGENA GRACILLIMA (Seguenza).

*Amphorina gracilis* Costa, Atti Acad. Pont., vol. 7, 1856, p. 121, pl. 11, fig. 11.

*Amphorina gracillima* Seguenza, Foram. mon. Mioc. Messina, 1862, p. 51, pl. 1, fig. 37.

*Lagena gracillima* Jones, Parker, and H. B. Brady, Pal. Soc. Mon., vol. 19, 1866, p. 45, pl. 1, figs. 36, 37.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 456, pl. 56, figs. 21, 22, 24–26 [19?, 20?, 23?, 27?, 28?].—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 306, pl. 53, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913 p. 11, pl. 1, fig. 4.

The only Philippine stations for which records were obtained of this species are *Albatross* D5201, Sogod Bay, southern Leyte in 554 fathoms (1,012 meters), and D5638, in 517 fathoms (946 meters), entrance to Tifu Bay, Bouro Island.

*Lagena gracillima—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s.,m..... | Rare. |
| | | | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne.gy.s..... | |

### LAGENA ELONGATA (Ehrenberg).

*Miliola elongata* Ehrenberg, Bericht preuss. Akad. Wiss. Berlin, 1844, p. 274, 1845, p. 371; Mikrogeologie, 1854, pl. 25, fig. 1.

*Lagena elongata* Tate and Blake, Yorkshire Lias, 1876, p. 454, pl. 18, figs. 9, 9*a*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 457, pl. 56, fig. 29.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 12, pl. 1, fig. 5.

Very typical specimens of this species have occurred in material from the following *Albatross* stations in the Philippines: D5178, in 78 fathoms (143 meters), near Romblon; D5259, in 312 fathoms (571 meters), off northeastern Panay, bottom temperature 49.3° F. (9.6° C.); and D5660, in 692 fathoms (1,266 meters), in Flores Sea.

*Lagena elongata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne.s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy.m., glob.. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy.m.,s..... | Rare. |

### LAGENA APICULATA (Reuss).

Plate 52, fig. 6.

*Oolina apiculata* Reuss, in Haidinger's Nat. Abhandl., vol. 4, 1850, p. 22, pl. 1 fig. 1.

*Lagena apiculata* Reuss, Sitz. Akad. Wiss. Wien, vol. 46, 1862 (1863), p. 31 pl. 1, figs. 4–8, 10, 11.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 453, pl. 56, figs. 4, 15–18.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1913, p. 13.

A single specimen of this species was obtained from *Albatross* station D5648 in 559 fathoms (1,021 meters), Buton Strait, bottor temperature 39.2° F. (4.0° C.).

From the North Pacific records this species seems to be found i deep and cold waters.

*Lagena apiculata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | 1 | D5648... | 5 35 00 S.; 122 20 00 E... | 559 | ....... | gn.m........ | Rare. |

### LAGENA HISPIDA Reuss.

"*Sphaerulae hispidae*" Soldani, Testaceographia, vol. 2, 1798, p. 53, pl. 1 figs. V, X.

*Lagena hispida* Reuss, Zeitschr. deutsch. geol. Ges., vol. 10, 1858, p. 43; Sit Akad. Wiss. Wien, vol. 46, 1863, p. 335, pl. 6, figs. 77–79.—H. B. Brady, Re Voy. *Challenger*, Zoology, vol. 9, 1884, p. 459, pl. 57, figs. 1–4; pl. 59, figs. 2, 5.- Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 53, fig. 8.—Cushma Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 13, pl. 4, figs. 4, 5; pl. 5, fig. 1.

This species has occurred at the following Philippine station *Albatross* D5120, in 393 fathoms (719 meters), Verde Island Passage bottom temperature 43.7° F. (6.5° C.); D5192, in 32 fathoms (5 meters), off northern Cebu Island; D5257, in 158 fathoms (289 m ters), eastern Illana Bay, southern Mindanao; and D5259, in 31 fathoms (571 meters), off northwestern Panay, bottom temperatu 49.3° F. (9.6° C.).

*Lagena hispida—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13288 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn.m.,s..... | Rare. |
| 13045 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn.s......... | Rare. |
| 13046 | U.S.N.M. | 1 | D5257... | 7 22 12 N.; 124 12 15 E.. | 158 | ....... | m........... | Rare. |
| 13047 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy.m.,glob.. | Rare. |

### LAGENA HISPIDA Reuss, var. TUBULATA Sidebottom.

*Lagena hispida* Reuss, var. *tubulata* Sidebottom, Journ. Quekett Micr. Club, ser. 2, vol. 11, 1912, p. 385, pl. 15, figs. 3–5.

*Description.*—Test with globular body and long, cylindrical neck, surface covered with long delicate spines with a symmetrical arrangement of larger tubular ones, variously placed.

Length up to 0.5 mm.

*Distribution.*—The only station of the present series from which this variety was obtained is *Albatross* D5666, in 272 fathoms (498 meters), off Celebes, bottom temperature 47.5° F. (8.6° C.).

The specimens described by Sidebottom were from the South-west Pacific. This is the first record from the North Pacific.

*Lagena hispida*, var. *tubulata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

### LAGENA HEXAGONA (Williamson), var. SCALARIFORMIS Williamson.

*Entosolenia squamosa* (Montagu), var. *scalariformis* Williamson, Recent Foraminifera of Great Britain, 1858, p. 13, pl. 1, fig. 30.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 17, pl. 6, fig. 4.

The only occurrence in the region as far as noted was *Albatross* station D5445, in 383 fathoms (699 meters), off Atalaya Point, Batag Island, off east coast of Luzon, bottom temperature 44.3° F. (6.8° C.).

*Lagena hexagona*, var. *scalariformis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s..... | Rare. |

### LAGENA STRIATA (d'Orbigny).

*Oolina striata* d'Orbigny, Foram. Amér. Mérid., 1839, p. 21, pl. 5, fig. 12.

*Lagena striata* Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), p. 327, pl. 3, figs. 44, 45; pl. 4, figs. 46, 47.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 460, pl. 57, figs. 22, 24.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 19, pl. 7, figs. 4, 5.

The typical form of this species was noted from the following stations: *Albatross* H4898, in 221 fathoms (405 meters), Sulu Sea off western Mindanao; D5277, in 80 fathoms (146 meters), China Sea, etc., off southern Luzon, bottom temperature 58.6° F. (14.7° C. D5318, China Sea, vicinity Formosa, 340 fathoms (946 meters), an D5638, in 517 fathoms (622 meters), entrance to Tifu Bay, Bour Island.

*Lagena striata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13036 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | sh., p., s., fne. s. | Rare. |
| 13037 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 13035 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Rare. |
| | | | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | |

### LAGENA STRIATA (d'Orbigny), var. HAIDINGERI (Czjzek).

*Oolina haidingeri* Czjzek, Haidinger's Nat. Abhandl., vol. 2, 1847, p. 138, pl. figs. 1, 2.

*Lagena haidingeri* Reuss, Sitz. Akad. Wiss. Wien, vol. 46, pt. 1, 1862 (1863), 326, pl. 3, fig. 41.

*Lagena striata* H. B. Brady (part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, 57, figs. 29, 30.

*Lagena striata*, var. *haidingeri* Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 19 p. 19, pl. 7, fig. 6.

A single station is all the record for this variety in the Philippin *Albatross* station D5178, in 78 fathoms (143 meters), off Romblon.

*Lagena striata, var. haidingeri—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundar |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13040 | U.S.N.M. | 4 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |

### LAGENA STRIATA (d'Orbigny), var. STRUMOSA (Reuss).

*Lagena strumosa* Reuss, Zeitschr. geol. Ges., 1858, p. 434; Sitz. Akad. W Wien, vol. 46, pt. 1, (1862) 1863, p. 328, pl. 4, fig. 49.

*Lagena striata* (d'Orbigny), var. *strumosa* Cushman, Bull. 71, U. S. Nat. M pt. 3, 1913, p. 20, pl. 7, figs. 7-10.

I have had this variety from *Albatross* station D5178, in 78 fatho (143 meters), off Romblon; and D5187, in 225 fathoms (412 mete Tanon Strait, east coast of Negros Island, bottom temperature 53 F. (12° C.).

In the North Pacific material from about Japan this variety w found frequently, but it has been seen but twice in the Philipp material.

*Lagena striata*, var. *strumosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 73 | ....... | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft. gn. m... | Rare. |

### LAGENA SEMISTRIATA Williamson.

*Lagena striata*, var. *semistriata* WILLIAMSON, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 14, pl. 1, figs. 9, 10.

*Lagena semistriata* JONES, PARKER, and H. B. BRADY, Mon. Foram. Crag, 1866, p. 34, pl. 4, fig. 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 465, pl. 57, figs. 14, 16, 17.

*Description.*—Test pyriform, widest near the base and gradually tapering to the aperture, which is at the end of a fairly long neck; surface smooth except the basal portion, which is ornamented by a series of short longitudinal costae running back to the lower end of the test.

Length about 0.75 mm.

*Distribution.*—This species was found in material from a single Philippine station, *Albatross* D5551, in 193 fathoms (353 meters) off Jolo, bottom temperature 53.3° F. (11.8° C.).

This species is not recorded in the rest of the North Pacific.

*Lagena semistriata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E.. | 193 | 53.3 | fne. s........ | Rare. |

### LAGENA SULCATA (Walker and Jacob).

*Serpula* (*Lagena*) *sulcata* WALKER and JACOB, Adam's Essays, Kanmacher's ed., 1798, p. 634, pl. 14, fig. 5.

*Lagena sulcata* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 351.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 462, pl. 57, figs. 23, 26, 33, 34.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 22, pl. 9, fig. 2.

This species seems to have occurred more often than most others of the genus in the Philippine material. It was recorded from *Albatross* stations D5178, in 78 fathoms (143 meters), off Romblon; D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); D5420, in 127 fathoms (233 meters), off Cruz Point, Bohol Island, bottom temperature 59° F.

(15° C.); D5443, in 241 fathoms (441 meters), off Atalaya Poin Batag Island, east coast of Luzon, bottom temperature 51.3° (10.7° C.); D5638, in 517 fathoms (946 meters) at the entrance Tifu Bay, Bouro Island; and D5666, in 272 fathoms (498 meter off Celebes, bottom temperature 47.5° F. (8.6° C.).

These stations are well scattered over the area of dredging ope tions, and probably the species is much more common than in cated here.

*Lagena sulcata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12184 | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 13026 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 13027 | U.S.N.M. | 1 | D5420... | 9 49 35 N.; 123 45 00 E.. | 127 | 59.0 | ............... | Rare. |
| 13024 | U.S.N.M. | 1 | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh..... | Rare. |
| 12183 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Rare. |
| 13025 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m........ | Rare. |

### LAGENA SULCATA (Walker and Jacob), var. APICULATA Cushman.

*Lagena sulcata*, apiculate forms, H. B. BRADY, Rep. Voy. *Challenger*, Zool vol. 9, 1884, pl. 58, figs. 4, 17 (?).

*Lagena sulcata*, var. *apiculata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p pl. 9, figs. 3, 4.

Specimens of this variety occurred at the following three A *tross* stations: D5133, in 38 fathoms (70 meters), Sulu Sea western Mindanao; D5178, in 78 fathoms (143 meters) off Romb and D5277, China Sea off southern Luzon, in 80 fathoms (146 met bottom temperature 58.6° F. (14.7° C.).

*Lagena sulcata, var. apiculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abun |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13028 | U.S.N.M. | 1 | D5133... | Island off Panabutan Point; N. 52° E. 1.50 miles. | 38 | ....... | fne. s........ | Rare |
| 12815 | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare |
| 13029 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne.s., m., sh. | Rare |

### LAGENA ACUTICOSTA Reuss.

*Lagena acuticosta* REUSS, Sitz. Akad. Wiss. Wien, vol. 44, pt. 1, 1861 (186 305, pl. 1, fig. 4; vol. 46, pt. 1, 1862 (1863), p. 331, pl. 5, fig. 63.—H. B. B Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 57, figs. 31, 32; figs. 20 (?), 21.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 23, figs. 9, 10; pl. 23, fig. 2.

Records of the occurrence of this species in material from three *Albatross* stations in the region are as follows: D5120, in 393 fathoms (719 meters), Verde Island Passage, bottom temperature 43.7° F. (6.5° C.); D5133, in 38 fathoms (70 meters), Sulu Sea off western Mindanao; and D5178, in 78 fathoms (143 meters), off Romblon.

*Lagena acuticosta—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m....... | Rare. |
| | | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | fne. s........ | |
| U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |

### LAGENA GRACILIS Williamson.

*Lagena gracilis* WILLIAMSON, Ann. Mag. Nat. Hist., ser. 2, vol. 1, 1848, p. 13, pl. 1, figs. 3, 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 464, pl. 58, figs. 19, 22–24.—CUSHMAN, Bull. 71, U.S. Nat. Mus., pt. 3, 1913, p. 24, pl. 8, figs. 5, 6.

Three *Albatross* stations gave records for this species as follows: H4914, in 464 fathoms (848 meters), China Sea off southern Luzon, bottom temperature 46.5° F. (8° C.); D5514, in 697 fathoms (1,274 meters), off northern Mindanao, bottom temperature 52.3° F. (11.2° C.); and D5666, off Celebes, bottom temperature 47.5° F. (8.6° C.). No specimens of this species were noted in the shallow warmer water of the Archipelago.

*Lagena gracilis—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5514... | 8 32 42 N.; 123 58 36 E. | 697 | 52.3 | gn. m., s.... | Rare. |
| U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E. | 272 | 47.5 | gn. m....... | Rare. |
| U.S.N.M. | 1 | H4914... | 13 38 05 N.; 120 33 00 E. | 464 | 46.5 | gy. m., s.... | Rare. |

### LAGENA STAPHYLLEARIA (Schwager).

*Fissurina staphyllearia* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 209, pl. 5, fig. 24.

*Lagena staphyllearia* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 474, pl. 59, figs. 8–11.—CUSHMAN, Bull. 71, U.S.Nat.Mus., pt. 3, 1913, p. 31, pl. 17, fig. 3.

The two *Albatross* stations from which this species was obtained D5185, in 638 fathoms (1,167 meters), between Panay and [illegible], bottom temperature 49.8° F. (9.8° C.); and D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). It also occurred, as has been already noted, at *Nero* station 862 in 1,550 fathoms (2,834 meters) off the east coast of Luzon. Apparently it does not occur, at least in any numbers, in the shallow waters of this region from which most of the material came.

*Lagena staphyllearia—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13031 | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E... | 638 | 49.8 | gn. m........ | Rare. |
| 13033 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | • 494 | 41.2 | fne. gy. s... | Rare. |

### LAGENA ALVEOLATA H. B. Brady, var. SUBSTRIATA H. B. Brady.

*Lagena auriculata* H. B. BRADY, var. *substriata* H. B. BRADY, Quart. Journ Micr. Soc., vol. 21, 1881, p. 61.

*Lagena alveolata* H. B. BRADY, var. *substriata* H. B. BRADY, Rep. Voy. *Challenge* Zoology, vol. 9, 1884, p. 488, pl. 60, fig. 34.—CUSHMAN, Bull. 71, U. S. Nat Mus., pt. 3, 1913, p. 34, pl. 18, fig. 5.

The only record for this variety is *Albatross* station D5236, in 49- fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottor temperature 41.2° F. (5.1° C.).

*Lagena alveolata, var. substriata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13043 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |

### LAGENA MARGINATA Walker and Boys.

*Serpula* (*Lagena*) *marginata* WALKER and BOYS, Test. Min., 1784, p. 2, pl. 1, fig.

*Vermiculum marginatum* MONTAGU, Test. Brit., 1803, p. 524.

*Entosolenia marginata* WILLIAMSON (part) Ann. Mag. Nat. Hist., ser. 2, vol. 1848, p. 17, pl. 2, figs. 15-17.

*Lagena marginata* BROWN, Illus. Conch. Great Britain, 1827, pl. 1, figs. 30, 31. H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 476, pl. 59, fi 21-23.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 307, pl. 54, fig. 2.—Cus MAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 37, pl. 22, figs. 1-7.

Although this is a very common and widely distributed species, have but two records of its occurrence in this region, *Albatross* st tions D5301, in 208 fathoms (381 meters), China Sea, vicinity

Hongkong, bottom temperature 50.5° F. (10.8° C.), and D5349, in 730 fathoms (1,335 meters), Palawan Passage, bottom temperature 40.6° F. (4.7° C.).

*Lagena marginata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy.m.,s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | Co.,s....... | Rare. |

### LAGENA LAGENOIDES (Williamson).

*Entosolenia marginata* WALKER and BOYS, var. *lagenoides* WILLIAMSON, Rec. Foram. Great Britain, 1858, p. 11, pl. 1, figs. 25, 26.

*Lagena lagenoides* REUSS, Sitz. Akad. Wiss. Wien, vol. 46, 1862, p. 324, pl. 2, figs. 27, 28.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 479, pl. 60, figs. 6, 8, 9, 12.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 39, pl. 16, fig. 2.

I have record of the occurrence of this species at but a single Philippine station, D5301, in 208 fathoms (381 meters), China Sea, vicinity of Hongkong, bottom temperature 50.5° F. (10.8° C.).

*Lagena lagenoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Rare. |

### LAGENA FORMOSA Schwager.

*Lagena formosa* SCHWAGER (part), *Novara*-Exped., Geol. Theil., vol. 2, 1886, p. 207, pl. 4, figs. 19*a*, 19*d* (not 19*b*, 19*c*).—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 41, pl. 11, fig. 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 41, pl. 11, fig. 6.

The only record for this species in the Philippine material which I have examined is *Albatross* station D5660, in 692 fathoms (1,266 meters) in Flores Sea, bottom temperature 39.2° F. (4° C.).

The scarcity of this species in this material bears out the generalization already made that it is a species of deep water. Brady noted this fact in the *Challenger* report, and it was very certainly true of the material of the North Pacific which I have had at my disposal. It will be noted that the bottom temperature at this station is much lower than in most cases in the Philippine Archipelago and is practically an ocean bottom temperature for this depth.

*Lagena formosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13062 | U.S.N.M. | 1 | D5660... | 5 36 30 S., 120 49 00 E... | 692 | 39.2 | gy. m., s.... | Rare. |

### LAGENA BICARINATA (Terquem).

*Fissurina bicarinata* Terquem, Mém. Soc. Géol. France, ser. 3, vol. 2, 1882, 31, pl. 1 (9), figs. 24*a*, *b*.

*Lagena bicarinata* Balkwill and Millett, Journ. Micr., vol. 3, 1884, p. 82, pl. fig. 4.

But one station is recorded for this species in the Philippine mate rial I have examined, *Albatross* station H4914, in 464 fathoms (84 meters), China Sea off southern Luzon, bottom temperature 46.5°F. (8° C).

*Lagena bicarinata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14919 | U.S.N.M. | 1 | H4914... | 13 38 05 N.; 120 33 00 E... | 464 | 46.5 | gy. m., s.... | Rare. |

### LAGENA LAMELLATA Sidebottom.

*Lagena lamellata* Sidebottom, Journ. Quekett Micr. Club, ser 2, vol. 11, 1912, p 396, pl. 16, figs. 24, 25.

*Description.*—Test pyriform, tapering to a slender neck with spira markings, wall compound, outer coating thin and flaky, restin upon fine tubular spines which in turn come out from an inner thick ened wall with a polygonal structure when denuded of spines an seen in surface view or from within.

Diameter about 0.3 mm.

*Distribution.*—The only Philippine material I have seen is fro *Albatross* station D5187, in 225 fathoms (412 meters), Tanon stra east coast of Negros, bottom temperature 53.6° F. (12° C). Th is the first record for the North Pacific. The specimens describe by Sidebottom were from the South-west Pacific, depths of 505 an 484 fathoms (923 and 885 meters).

This is a complicated test and the specimens showed nothin which will add to the characters as shown by Sidebottom.

*Lagena lamellata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5187... | 9 16 45 N.; 123 21 15 E... | 225 | 53.6 | sft. gn. m.... | Rare. |

## Subfamily NODOSARIINAE.

### Genus NODOSARIA d'Orbigny, 1826.

### NODOSARIA (GLANDULINA) ROTUNDATA (Reuss).

*Glandulina rotundata* REUSS, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 366, pl. 46, fig. 2.

*Nodosaria (Glandulina) rotundata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 491, pl. 61, figs. 17–19.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 54, fig. 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 47, pl. 28, fig. 6.

Rare specimens of this species were found in material from the ollowing three stations, which are widely scattered in the region: D5192, off northern Cebu Island, 32 fathoms (59 meters); D5318, China Sea, vicinity of Formosa, 340 fathoms (622 meters); and D5580 icinity of Darvel Bay, Borneo, 162 fathoms (297 meters), bottom emperature 55.8° F. (13.2° C.).

*Nodosaria rotundata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 1253 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Rare. |
| 1254 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 1255 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br.s., Co..... | Rare. |

### NODOSARIA (GLANDULINA) LAEVIGATA d'Orbigny.

Plate 33, fig. 1.

"*Cornu Hammonis* erectum globosius" PLANCUS, Conch. Min., 1739, p. 16, pl. 13, fig. 1.

*Nodosaria (Glandulina) laevigata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 252, pl. 10, figs. 1–3.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 490, pl. 61, figs. 20–22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 308, pl. 55, fig. 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 47, pl. 24, figs. 1, 2.

*Glandulina laevigata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 29, pl. 1, figs. 4, 5.

At 11 stations in the area specimens of this species were obtained, most of the specimens being without spines at the apical end. The stations ranged in depth from 32 to 752 fathoms (59 to 1,375 meters), the average depth being 315 fathoms (576 meters). Where bottom temperatures were given, they ranged from 41.2° F. to 56.4° F. (5.1° C. to 13.5° C.), the average temperature being 50.5° F. (10.8° C.).

*Nodosaria laevigata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15278 | U.S.N.M. | 1 | D5178... | 12 93 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| 12197 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Rare. |
| 12191 | U.S.N.M. | 1 | D5216... | 12 52 00 N.; 123 23 30 E... | 215 | 51.9 | gn. m....... | Rare. |
| 12198 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m....... | Rare. |
| 12195 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Rare. |
| 12194<br>13065 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 12196 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| 12193 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 12192 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s........ | Rare. |
| 12190 | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh........ | Rare. |
| 15279 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Rare. |

### NODOSARIA (GLANDULINA) LAEVIGATA d'Orbigny, var. STRIATULA Cushman.

Plate 33, fig. 2.

*Nodosaria* (*Glandulina*) *laevigata* D'ORBIGNY, var. *striatula* CUSHMAN, Proc. U. Nat. Mus., vol. 51, 1917, p. 653.

*Description.*—Variety differing from the typical in having t surface ornamented with numerous very fine longitudinal costae.

*Distribution.*—Type specimen (No. 5107, U. S. N. M.) from *Alb tross* station D5236, in 494 fathoms (903 meters), Pacific Ocean, ea coast of Mindanao, bottom temperature 41.2° F. (5.1° C.).

Brady figures a striate specimen of this species in the *Challeng* Report.

*Nodosaria laevigata, var. striatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundar |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 5107 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |

### NODOSARIA SIMPLEX Silvestri.

*Nodosaria simplex* SILVESTRI, Atti Accad. Gioenia, Catania, ser. 3, vol. 7, 18 p. 95, pl. 11, figs. 268–272.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 496, pl. 62, figs. 4, 5, and 6?.—FLINT, Rep. U. S. Nat. Mus., 1897 (189 p. 309, pl. 55, fig. 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. pl. 28, fig. 5.

The only record for this species in all the material examined fr the region is off Singapore in 13 fathoms (23 meters), U.S.N No. 15661. It was typical, however.

The *Challenger* specimens were from off the Ki Islands, 129 fath (236 meters), and off the west coast of New Zealand in 275 fath (503 meters). They had the peculiar initial chamber with a b spine and the later chambers pyriform. A similar specimen found off the Galapagos Islands in deep water. The Atlantic mate recorded from about the British Isles does not seem from the pu lished figures to be typical.

### NODOSARIA PYRULA d'Orbigny.

Plate 33, figs. 3–5.

"*Orthoceras Monile*" Soldani, Testaceographia, vol. 2, 1798, p. 35, pl. 10, figs. *b, c.*

*Nodosaria pyrula* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 13.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 497, pl. 62, figs. 10–12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 55, fig. 4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 49, pl. 26, figs. 1–3.

Brady in the *Challenger* Report records this species from off the Philippines in 95 fathoms (174 meters). Both in its typical form and the two following varieties it has proved to be very common in the region, most of the stations, however, being in the Philippine Archipelago and occurring but once in the region to the southward. Some of the stations gave abundant and often very complete specimens, showing the very long, slender, pointed proloculum, very different from that usually found in this genus.

The stations range in depth from 218 to 559 fathoms (399 to 1,021 meters), the average 387 fathoms (708 meters). The bottom temperatures range from 41.2° to 53.8° F. (5.1° to 12.1° C.), the average being 48.6° F. (9.2° C.)

*Nodosaria pyrula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| 12299 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m.... | Few. |
| 12301 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Few. |
| 12302 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Rare. |
| 12304 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 12303 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy.m.,fne.s.. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5648... | 5 35 00 S.; 122 20 00 E.. | 559 | 39.2 | gn. m....... | Rare. |

### NODOSARIA PYRULA d'Orbigny, var. SEMIRUGOSA d'Orbigny.

Plate 33, figs. 6, 7.

*Nodosaria semirugosa* d'Orbigny, Foram. Foss. Vienne, 1846, p. 34, pl. 1, figs. 20–23.—Millett, Journ. Roy. Micr. Soc., 1902, p. 515, pl. 11, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 50, pl. 26, figs. 4–8.

*Nodosaria* No. 35, Von Schlicht, Foram. Septarienthones von Pietzpuhl, 1870, p. 24, pl. 7, fig. 20.

*Nodosaria stipitata* Reuss, var. *costulata* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, Abth. 1, 1870, p. 471.

*Nodosaria costulata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 515, pl. 63, figs. 23–27.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 58, fig. 1.

In the *Challenger* Report Brady records this variety as *Nodosaria costulata* from off the Philippines in 95 fathoms (174 meters). It can hardly be distinguished from typical *N. pyrula* in much of the material, all gradations existing between the two extremes and also toward the following variety.

At numerous stations throughout the Philippine Archipelago this variety has occurred usually with the typical form. The depths range from 83 to 554 fathoms (151 to 1,012 meters), average 302 fathoms (552 meters), the bottom temperatures range from 41.2° to 63.6° F (5.1° to 17.5° C.), average 52.2° F. (11.2° C.).

*Nodosaria pyrula*, var. *semirugosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12308 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| 12311 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| 12310 | U.S.N.M. | 10 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Common. |
| 12314 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 12309 | U.S.N.M. | 1 | D5243... | 6 50 55 N.; 126 14 35 E.. | 218 | 63.6 | gy. m....... | Rare. |
| 12312 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Rare. |
| 15134 | U.S.N.M. | 2 | D5371... | 13 49 40 N.; 121 40 15 E.. | 83 | ....... | gn. m........ | Rare. |
| 13153 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Rare. |
| 12313 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 279 | 53.5 | gn. m....... | Rare. |
| 15135 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Few. |
| 15136 | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.3 | ............. | Rare. |

### NODOSARIA PYRULA d'Orbigny, var. LONGI-COSTATA Cushman.

Plate 33, figs. 8, 9.

*Nodosaria pyrula* D'ORBIGNY, var. *longi-costata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 5, 1917, p. 653.

*Description.*—Variety with the whole of the chamber body ornamented by longitudinal costae, even connecting across the connecting necks; aperture with the costae running to the edge of the opening.

*Distribution.*—Type specimen (U.S.N.M. No. 9108) from *Albatross* station D5388, in 226 fathoms (414 meters), between Burias and Luzon, bottom temperature 51.4° F. (10.7° C.). In addition to the type station the variety occurred at the following stations, often in considerable numbers: D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte, bottom temperature 52.8° F. (11.5° C.); D5214, in 218 fathoms (399 meters), east of Masbate Island, bottom temperature 51.4° F. (10.7° C.); D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); D5311, in 88 fathoms (161 meters), China Sea, off Hongkong; D5338, in 43 fathoms (78 meters), Palawan Passage; D5371, in 83 fathoms (151 meters), off Marinduque Island, and D5537, in 254 fathoms (464 meters), between Negros and Siquijor, bottom temperature 53.5° F. (11.8° C.).

This variety is found in company with var. *semirugosa* d'Orbigny, but seems distinct in form as well as in ornamentation.

*Nodosaria pyrula*, var. *longi-costata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible]<br>[illegible]<br>[illegible] | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Rare. |
| | | | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m.... | Rare. |
| | | | D5371... | 13 49 40 N.; 121 40 15 E... | 83 | ....... | gn. m....... | |
| [illegible] | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Rare. |

### NODOSARIA ANNULATA (Terquem and Berthelin).

Plate 34, figs. 1, 2*a*, *b*.

*Glandulina annulata* TERQUEM and BERTHELIN, Mém. Soc. géol. France, ser. 2, vol. 10, Mem. 3, 1875, p. 22, pl. 1, fig. 25.

*Nodosaria radicula*, var. *annulata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 496, pl. 62, figs. 1, 2.

*Description.*—Test subcylindrical, composed of several chambers inflated, with deeply constricted sutures, initial end rounded, wall smooth, last-formed chambers somewhat decreasing in size; aperture central, terminal, rounded with a slight lip.

Length about 1 mm. or somewhat more.

*Distribution.*—This species occurred at the following *Albatross* stations: D5236, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5278, in 102 fathoms (187 meters), China Sea, off southern Luzon, bottom temperature 59.6° F. (15.3° C.); D5592, in 305 fathoms (558 meters), Sibuko Bay, Borneo, bottom temperature 43.3° F. (6.1° C.); and D5626, in 265 fathoms (485 meters), between Gillolo and Kayoa Islands.

Brady had specimens from the stations off the Ki Islands in 129 fathoms (236 meters).

Our specimens resemble those of the *Challenger* Report, and this may be a distinctive species of the Indo-Pacific region.

*Nodosaria annulata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne. s., sh., m. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5626... | 0 07 30 N.; 127 29 00 E... | 265 | ....... | gy. m., fne. s. | Rare. |

### NODOSARIA INSECTA Schwager.

Plate 34, fig. 3.

*Nodosaria insecta* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 224, pl. 5, figs. 53, 54.

*Description.*—Test elongate, straight or slightly curved, chambers numerous, inflated, sutures depressed, wall smooth, proloculum with a long spinous projection placed asymmetrically, apertural end ( the chamber with a slight neck.

Length up to 5 mm.

*Distribution.*—Specimens of this species were very common *Albatross* station D5236, in 494 fathoms (903 meters) Pacific Ocea off eastern coast of Mindanao, bottom temperature 41.2° F. (5.1° C. and D5121 in 108 fathoms (198 meters), off the east coast of Mindor

Some of our specimens were almost identical with the specime figured by Schwager. His specimens were from the Nicobar Islands- a fossil foraminiferal fauna, which, as has already been noted, is ve closely related to that of the waters of the Philippines.

*Nodosaria insecta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 12274 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Few. |
| 12275 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common |
| 15280 | U.S.N.M. | 10+ | | | | | | |

## NODOSARIA RADICULA (Linnaeus).

Plate 34, fig. 4.

"Cornu Hammonis erectum" PLANCUS, Conch. Min., 1739, p. 14, pl. 1, fig. 5.

*Nautilus radicula* LINNAEUS, Syst. Nat., ed. 12, 1767, pp. 1164, 285; (Gmelin' ed. 13, 1788, vol. 1, pt. 6, p. 3373, No. 18.

*Nodosaria radicula* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 252, No. 3; Modèl 1826, No. 1.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 49 pl. 61, figs. 28–31.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 309, pl. 5 fig. 1.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 52.

Specimens of this species were obtained from the following fou stations: H4898, Sulu Sea, off western Mindanao, 221 fathoms (40 meters); D5300, China Sea, vicinity southern Luzon, 265 fathom (485 meters); D5586, Sibuko Bay, Borneo, and vicinity, 347 fathom (635 meters), bottom temperature 44° F. (6.6° C.); D566 Macassar Strait, 272 fathoms (498 meters), bottom temperatur 47.5° F. (8.6° C.).

*Nodosaria radicula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 12344 | U.S.N.M. | 2 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy, m., s.... | Rare. |
| 15025 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Rare. |
| 12245 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m....... | Rare. |
| 14926 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob.. | Rare. |

### NODOSARIA INSOLITA Schwager.

*Nodosaria insolita* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 230, pl. 6, fig. 63.

*Description.*—Test elongate, tapering, slightly arcuate, composed of numerous inflated chambers, each much broader than long, sutures deeply constricted, wall smooth, apertural end with a slight neck.

Length up to 8 mm.

*Distribution*—Typical specimens were obtained from *Albatross* stations D5176, in 260 fathoms (476 meters), Verde Island Passage, and an abundance of large specimens from D5236, in 494 fathoms (903 meters), east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). Schwager's specimens were from the fossil beds of Kar Nicobar.

The aperture shown in Schwager's figure seems as though the specimen must have been broken. Our specimens agree very closely in all other characters.

*Nodosaria insolita—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5176... | 13 35 15 N.; 120 53 20 E... | 260 | ....... | s............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Abundant. |
| [illegible] | U.S.N.M. | 1 | | | | | | |

### NODOSARIA INFLEXA Reuss.

*Nodosaria inflexa* REUSS, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. 131, pl. 2, fig. 1; Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 472, No. 16.—VON SCHLICHT, Foram. Septarienthones von Pietzpuhl, 1870, pl. 38, fig. 3.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 498, pl. 62, fig. 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 52, pl. 25, fig. 1.

Brady recorded this species in the *Challenger* Report from off the Philippines in 95 fathoms (174 meters). I have found material at four stations as follows: D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature, 52.8° F. (11.5° C.); D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), bottom temperature, 41.2° F. (5.1° C.); D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature, 49.3° F. (9.6° C.); D5487, between Leyte and Mindanao, 732 fathoms (1,339 meters), bottom temperature, 52.3° F. (11.2° C.).

*Nodosaria inflexa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5201...<br>D5236...<br>D5259...<br>D5487... | 10 10 00 N.; 125 04 15 E...<br>8 50 45 N.; 126 26 52 E...<br>11 57 30 N.; 121 42 15 E...<br>10 02 45 N.; 125 05 33 E... | 554<br>494<br>312<br>732 | 52.8<br>41.2<br>49.3<br>52.3 | gy. s., m....<br>fne. gy. s.....<br>gy. m., glob.<br>gn. m....... | Rare. |

### NODOSARIA SOLUTA (Reuss).

Plate 34, figs. 5, 6.

*Dentalina soluta* Reuss, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 60, pl. 3, figs. 4*a*, *b*.

*Nodosaria soluta* Bornemann, Zeitschr. deutsch. geol. Ges., vol. 7, 1855, p. 322, pl. 12, fig. 12.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 503, pl. 62, figs. 13–16; pl. 64, fig. 28.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 53, pl. 26, figs. 9–11.

This species is one of the most common in the region, being found in the Philippine Archipelago and to the southward as well, off Borneo, in the Gulf of Boni, Flores Sea, Macassar Strait, etc. With but one exception, that of 78 fathoms (143 meters), the range is between 208 and 940 fathoms (381 and 1,719 meters) with the average 528 fathoms (966 meters). The bottom temperatures show a wide range from 36.7° to 62.4° F. (2.6° to 16.8° C.), the average being 47.3° F. (8.4° C.).

Nearly all the specimens show rather tumid, close-set chambers, the proximal half of each being much roughened, as shown in one of the figures of the *Challenger* Report.

*Nodosaria soluta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15106 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s......... | Rare. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn. m......... | Few. |
| 12220<br>12225 | U.S.N.M. | 7 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Few. |
| 15107 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 12223 | U.S.N.M. | 10 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s...... | Common. |
| 15109 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Few. |
| 12220 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s...... | Rare. |
| | | | D5385... | 13 24 50 N.; 123 03 70 E.. | 327 | 62.4 | gy. m......... | Rare. |
| 15108 | U.S.N.M. | 1 | D5277... | ........................ | ....... | ....... | ............ | Rare. |
| 15110 | U.S.N.M. | 1 | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | ....... | gy. m., co. s.. | Rare. |
| 12231 | U.S.N.M. | 3 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| 15111 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m......... | Few. |
| 15112 | U.S.N.M. | 2 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m......... | Few. |
| 12222 | U.S.N.M. | 5 | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m......... | Few,. |
| 12229 | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 38 E.. | 569 | ....... | gn. m......... | Rare. |
| 12230 | U.N.S.M. | 9 | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m............ | Common. |
| 15113 | U.S.N.M. | 1 | D5487 .. | 10 02 45 N.; 125 05 33 E.. | 732 | 52.3 | gn. m......... | Rare. |
| 12227 | U.S.N.M. | 3 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Few. |
| 15114 | U.S.N.M. | 5 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m......... | Few. |
| 15115 | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m......... | Few. |
| 15116 | U.S.N.M. | 3 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Few. |
| 15117 | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m......... | Few. |
| 15118 | U.S.N.M. | 8 | D5650... | 4 53 45 S.; 121 29 00 E.. | 700 | 40.1 | gn. m......... | Few. |
| 15119 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m......... | Rare. |

### NODOSARIA COMMUNIS d'Orbigny.

Plate 34, fig. 7.

*Nodosaria* (*Dentalina*) *communis* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 35.

*Dentalina communis* d'Orbigny, Mém. Soc. Géol. France, vol. 4, 1840, p. 13, pl. 1, fig. 4.

*Nodosaria communis* Reuss, Verst. Böhm. Kreid., pt. 1, 1845, p. 28, pl. 12, fig. 21.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 504, pl. 62, figs. 19–22.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 54, pl. 28, figs. 1, 2.

Typical material which has been referred to this species has occurred at numerous stations throughout the region often in considerable numbers. With four exceptions the depths range from 162 to 494 fathoms (297 to 903 meters). The exceptions are four stations in shallower water in 34 to 88 fathoms (62 to 161 meters), and one station in the Molucca Sea in 1,560 fathoms (2,853 meters). Where given the bottom temperatures range from 41.1° to 55.8° F. (5° to 13.2° C.).

*Nodosaria communis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | gne. s........ | Rare. |
| | | | D5244... | 6 52 05 N.; 126 14 15 E.. | 171 | ....... | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 6 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5412... | 10 09 15 N.; 123 52 00 E.. | 162 | 54.8 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 4 | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m........ | Rare. |
| | | | | Tara Island.......... | ....... | ....... | .............. | |
| | | | | Apra Bay, Guam.......... | ....... | ....... | | |
| [illegible] | U.S.N.M. | 2 | D5198... | 9 40 50 N.; 123 30 45 E.. | 220 | 53.9 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5244... | 6 52 05 N.; 126 14 15 E.. | 171 | ....... | gy. m........ | Rare. |

NODOSARIA ROEMERI (Neugeboren).

*Dentalina roemeri* Neugeboren, Denkschr. Akad. Wiss. Wien, vol. 12, 1856, p. 82, pl. 2, figs. 13–17.

*Nodosaria roemeri* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 475.—Von Schlicht, Foram. Septarienthones von Pietzpuhl, 1870, pl. 10, figs. 21, 22, 24.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 505, pl. 63, fig. 1.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 55, pl. 24, figs. 4–6.

Although not common at any station, specimens which are fairly typical of this species have occurred at the following stations: D5112, China Sea, off southern Luzon, 177 fathoms (324 meters), bottom temperature 52.4° F. (11.3° C.); D5284, China Sea, vicinity southern Luzon, 422 fathoms (775 meters), bottom temperature 42.3° F. (5.7° C.); D5300, China Sea, vicinity southern Luzon, 265 fathoms (485 meters); D5301, China Sea, vicinity Hongkong, 208 fathoms (381 meters), bottom temperature 50.5° F. (10.8° C.); D5542, northern Mindanao and vicinity, 200 fathoms (366 meters), bottom temperature 54.3° F. (12.3° C.); D5386, Ragay Gulf, Luzon 287 fathoms (525 meters), bottom temperature 62.4° F. (16.8° C.) D5585, Sibuko Bay, Borneo, and vicinity, 476 fathoms (871 meters) bottom temperature 41.1° F. (5° C.); D5636, Pitt Passage, 1,26 fathoms (2,309 meters).

*Nodosaria roemeri—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12241 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 26 E.. | 177 | 52.4 | dk. gn. m.... | Rare. |
| 12232 | U.S.N.M. | 2 | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob | Rare. |
| 12239 | U.S.N.M. | 8 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Common. |
| 12238 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Rare. |
| 12242 | U.S.N.M. | 1 | D5386... | 13 38 30 N.; 122 44 30 E.. | 287 | 62.4 | s............ | Rare. |
| | | | D5542... | 8 48 30 N.; 123 35 30 E.. | 200 | 54.3 | fne. s., brk. sh. | |
| 12240 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |
| | | | D5636... | 1 55 00 S.; 127 42 30 E.. | 1,262 | ....... | gy. m., fne. s. | |

## NODOSARIA FILIFORMIS d'Orbigny.

Plate 34, fig. 9.

*Nodosaria filiformis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 253, No. 14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 500, pl. 63, fig 3-5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 55, pl. 27, figs. 1–

Specimens of *Nodosaria* which have elongated chambers as thos shown in the figure are here referred to this species. At a fe stations they are common, but as will be noted in the table are nc usually found in any considerable numbers. The range in dept from 100–750 fathoms (183–1,370 meters) is the range of greates abundance of *Nodosaria* and other Lagenidae.

*Nodosaria filiformis—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15059 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m.... | Rare. |
| 15060 | U.S.N.M. | 1 | D5189... | 9 56 30 N.; 123 15 00 E.. | 300 | 62.8 | gn. m....... | Rare. |
| 12263<br>12267 | U.S.N.M. | 5 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| 12268 | U.S.N.M. | 10 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Frequent |
| 15061 | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft. m....... | Rare. |
| 12269 | U.S.N.M. | 1 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh....... | Rare. |
| 15062 | U.S.N.M. | 1 | D5410... | 10 28 45 N.; 124 05 30 E.. | 385 | ....... | co. s., gn. m. | Rare. |
| 12265 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Rare. |
| 12264 | U.S.N.M. | 2 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............ | Rare. |
| 15063 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 54 | co. s........ | Rare. |
| 15064 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m....... | Rare. |
| 15065 | U.S.N.M. | 1 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52 | fne. s........ | Rare. |
| 15066 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 509 | ....... | co. s., m.... | Rare. |
| 15067 | U.S.N.M. | 9 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Common |

### NODOSARIA CONSOBRINA d'Orbigny, var. EMACIATA Reuss.

Plate 34, fig. 8; plate 35, fig. 1.

*Dentalina emaciata* Reuss, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 63, pl. 3, fig. 9.

*Nodosaria* (*D.*) *consobrina*, var. *emaciata* Reuss, Denkschr. Akad. Wiss. Wien, vol. 25, 1865, p. 132, pl. 2, figs. 12, 13.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 502, pl. 62, figs. 25, 26.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 310, pl. 56, fig. 1.—Cushman, Bull. 71 U. S. Nat. Mus., pt. 3, 1913, p. 56, pl. 27, fig. 9.

Throughout the region this species seems to occur often in very considerable numbers and represented by exceptionally fine large specimens. The depths range from 50 to 940 fathoms (91 to 1,719 meters), the average being 334 fathoms (611 meters). The bottom temperatures range from 36.7° to 55.8° F. (2.6° to 13.2° C.), the average being 49.6° F. (9.8° C.).

*Nodosaria consobrina*, var. *emaciata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | ...... | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 5 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Few. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s........ | Fare. |
| [illegible] | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gm. m....... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53 | gy. m., glob. | Frequent. |
| [illegible] | U.S.N.M. | 5 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Common. |
| [illegible] | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Few. |
| [illegible] | U.S.N.M. | | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 8 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Few. |
| [illegible] | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | H4896... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Rare. |
| | | | | Near Cebu................ | ...... | ....... | ............. | Rare. |

### NODOSARIA MUCRONATA (Neugeboren).

"*Orthoceras intortum*" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 98, pl. 105, fig. V.

*Nodosaria* (*Dentalina*) *obliqua* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 254, No. 36; Modèles, 1826, No. 5 (not *N. obliqua* (Linnaeus)).

*Dentalina mucronata* Neugeboren, Denkschr. Akad. Wiss. Wien, vol. 12, 1856, p. 83, pl. 3, figs. 8–11.

*Nodosaria mucronata* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 475, No. 30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 506, pl. 62, figs. 27–31.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 56, pl. 24, fig. 3; pl. 25, fig. 2; pl. 27, figs. 5–7; pl. 35, fig. 6.

Specimens of this species occurred rarely at the following five st tions: D5112, China Sea off southern Luzon, 177 fathoms (324 meten bottom temperature 52.4° F. (11.3° C.); D5120, Balayan Bay an Verde Island Passage, 393 fathoms (719 meters), bottom temper ture 43.7° F. (6.5° C.); D5201, Sogod Bay, southern Leyte Islan 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C. D5394, between Samar and Masbate, 153 fathoms (279 meters D5666, Macassar Strait, 272 fathoms (498 meters), bottom temper ture 47.5° F. (8.6° C.).

*Nodosaria mucronata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12270 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 26 E.. | 177 | 52.4 | dk. gn. m... | Rare. |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| 12271 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| | | | D5394... | 12 00 30 N.; 124 05 36 E.. | 153 | ....... | gn. m....... | Rare. |
| 12272 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

## NODOSARIA JAPONICA Cushman.

Plate 35, fig. 2.

*Nodosaria japonica* Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913., p. pl. 28, fig. 4.

This species was described from *Albatross* station D4900, off tl southern portion of Japan, where numerous subtropical species see to reach their northern limits. It is not surprising therefore to fin as in other cases that this species occurs frequently in the Philippin region. It has occurred at numerous stations well scattered through out the region ranging in depth mostly from 118 to 700 fathom (203 to 1,280 meters), with two stations less than 100 fathoms (18 meters), with depths of 78 and 14 to 25 fathoms (143 and 25 to 4 meters), with the average 293 fathoms (536 meters). The botto temperatures range from 50.4° to 57.4° F. (10.2° to 14.1° C.), wit the average of 52.5° F. (11.3° C.). This is close to the bottom ten perature of the original station, which was 52.9° F. (11.6° C.).

The Philippine specimens are not as large as those from southe Japan, but many of them are nearly 10 mm. in length and have tl characteristic form. The localities are off Romblon; off weste Bohol; between Marinduque and Luzon; China Sea, off southe Luzon; off Hongkong, and off Formosa; off Palawan, Jolo, an Tawi Tawi; and to the south near Patiente Strait; and in the Gu of Boni.

*Nodosaria japonica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m ....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m ....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5236 .. | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Rare. |
| [illegible] | U.S.N.M. | 7 | D5301... | 20 37 00 N.; 116 43 00 E.. | 208 | 50.5 | gy. m., s.... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5342 .. | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5567... | 13 35 27 N.; 123 27 18 E.. | 480 | ....... | gy. m....... | Rare. |
| | | | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | |

## NODOSARIA ANTENNULA Cushman.

Plate 35, fig. 3.

*Nodosaria antennula* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 653.

*Description.*—Test elongate, slightly arcuate, composed of numerous short chambers, sutures projecting, of clear shell material, proloculum bulbous, apertural end of chamber tapering to a rounded point, wall smooth.

Length up to 8 mm.

*Distribution.*—Type specimens (No. 9109, U.S.N.M.) from *Albatross* station D5236 in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). It also occurred at *Albatross* station D5121, in 108 fathoms (198 meters), east coast of Mindoro.

This species is a very peculiar one, the sutures being limbate, of clear shell material, standing out wider in side view than the chambers themselves, which are concaved between the sutures instead of inflated, as is usually the case in this genus.

*Nodosaria antennula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 8 | | | | | | |

### NODOSARIA SUBPOLYGONA Cushman.

Plate 35, figs. 4*a*, 4*b*, 5.

*Nodosaria subpolygona* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654.

*Description.*—Test elongate, only very slightly tapering except i the microspheric form, polygonal in end view, chambers numerou not at all inflated, sides parallel or very nearly so, sutures ver slightly if at all depressed, apertural end with a short stout nec aperture large, circular; surface ornamented by six raised ridg giving a hexagonal appearance in end view.

Length up to 5 mm.

*Distribution.*—Type specimens (U.S.N.M. No. 9110) from *Alba tross* station D5318 in 340 fathoms (622 meters), China Sea, vicinit of Formosa.

Both microspheric and megalospheric forms of the species occur a this station, the former having numerous chambers and a taperin base, the latter with a very large proloculum and the succeedin chambers but slightly increasing in size and fewer than in the micr spheric form.

The polygonal form with few ridges and the short neck with larg aperture will distinguish this species.

*Nodosaria subpolygona—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| 9110<br>15294 | U.S.N.M. | 2<br>1 | D5318... | ° ′ ″ ° ′ ″<br>21 32 00 N.; 117 46 00 E... | 340 | ° F.<br>....... | a., br. Co.... | Rare. |

### NODOSARIA CATENULATA H. B. Brady.

Plate 35, fig. 7.

*Nodosaria catenulata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 188 p. 515, pl. 63, figs. 32–34.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 31 pl. 58, fig. 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 57, pl. 2 fig. 3.

Very typical specimens were found at the following Philippin stations: D5242, in 191 fathoms (350 meters), vicinity of Pujad Bay, bottom temperature 64.1° F. (17.8° C.); D5255, in 100 fathom (183 meters), Gulf of Davao; D5259, in 312 fathoms (571 meters off northwestern Panay, bottom temperature 49.3° F. (9.6° C. D5368, in 181 fathoms (331 meters), off Marinduque Island; an

D5572, in 334 fathoms (611 meters), north of Tawi Tawi, bottom temperature 52.3° F. (11.2° C.). The specimens were very abundant at one of these stations.

Brady described this species from the *Challenger* station in the Philippines, depth 95 fathoms (174 meters), and from off Raine Island, Torres Strait, 155 fathoms (283 meters). Sidebottom records it from the east coast of Australia in 465 fathoms (850 meters). Flint's specimen was from the Gulf of Mexico, where *N. vertebralis* is abundant and may be a form of that species with few costae, or the distribution of *N. catenulata* may include this region also.

*Nodosaria catenulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E.... | 191 | 64.1 | sft. gy. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.... | 100 | ....... | sft. m........ | Rare. |
| [illegible] | U.S.N.M. | 6 | D5259... | 11 57 30 N.; 121 42 15 E.... | 312 | 49.3 | gy. m., glob.. | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5368... | 13 35 30 N.; 121 48 00 E.... | 181 | ....... | gy. m. ...... | Rare. |
| | | | D5572... | 5 31 26 N.; 120 09 45 E.... | 334 | 52.3 | s., sh......... | |

### NODOSARIA SCALARIS (Batsch).

Plate 35, fig. 6.

"Orthocertia *Flosculi*" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 91, pl. 95, figs. B–M.

Nautilus (*Orthoceras*) *scalaris* Batsch, Conch. des Seesandes, 1791, No. 4, pl. 2, figs. 4a, *b*.

Nodosaria *scalaris* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 340, pl. 16, figs. 2a, *b*, *c*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 510, pl. 63, figs. 28–31.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 58, pl. 24, fig. 7.

Brady in the *Challenger* Report records this species in 95 fathoms, (174 meters), off the Philippine Islands. The typical form has been found to be abundant in this material, occurring off various coasts of Luzon; off Romblon; Sogod Bay, southern Leyte; east of Masbate; Verde Island Passage; between Leyte and Mindanao; north of Tawi Tawi; and farther south in Darvel Bay and Sibuko Bay, Borneo, and Buton Strait. The depths range from 24 to 890 fathoms (44 to 1,628 meters), with the average 274 fathoms (502 meters), and the bottom temperatures from 38.3° to 63.1° F. (3.5° to 17.2° C.), with the average 50.4° F. (10.2° C.).

*Nodosaria scalaris*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 15075 | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E.... | 35 | ....... | gy. s......... | Rare. |
| 15076 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.... | 135 | 59.0 | dk. gy. m... | Few. |
| 12166 | U.S.N.M. | 2 | D5112... | 13 48 22 N.; 120 47 25 E.... | 177 | 52.4 | dk. gn. m.... | Few. |
| 12207 | U.S.N.M. | 8 | D5178... | 12 43 00 N.; 122 06 15 E.... | 78 | ....... | fne. s........ | Frequent |
| 12205<br>12209 | U.S.N.M. | 6 | D5201... | 10 10 00 N.; 125 04 15 E.... | 544 | 52.8 | gy. s., m..... | Frequent |
| | | | D5213... | 12 15 00 N.; 123 57 30 E.... | 80 | ....... | s. m., sh.... | Frequent |
| 12206 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 15079 | U.S.N.M. | 1 | D5269... | 13 39 50 N.; 120 59 30 E.... | 220 | ....... | fne. s., p.... | Rare. |
| 15080 | U.S.N.M. | 2 | D5278... | 14 00 10 N.; 120 17 15 E.... | 102 | 59.6 | fne. s., m., sh. | Few. |
| 15081 | U.S..NM. | 4 | D5282... | 13 53 00 N.; 120 26 45 E.... | 248 | 47.4 | dk. gy. s..... | Frequent |
| 15082 | U.S.N.M. | 2 | D5300... | 20 31 00 N.; 115 49 00 E.... | 265 | ....... | gy. m., s..... | Rare. |
| | | | D5313... | 21 30 00 N.; 116 43 00 E.... | 150 | 53.6 | s............ | Few... |
| 15083 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.... | 340 | ....... | s., br. Co.... | Rare. |
| | | | D5487... | 10 02 45 N.; 125 05 33 E.... | 732 | 52.3 | gn. m......... | Rare. |
| | | | D5572 .. | 5 31 26 N.; 120 09 45 E.... | 334 | 52.3 | s............ | Rare. |
| 12167 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E.... | 890 | 38.3 | gy. m., fne. s. | Few. |
| 15084 | U.S.N.M. | 4 | D5592... | 4 12 44 N.; 118 27 44 E.... | 305 | 43.3 | gn. m......... | Few. |
| 15085 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E..... | 24 | ....... | s., brk. sh... | Few. |
| 12208 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E..... | 540 | 40.1 | gn. m......... | Rare. |
| 15077 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E..... | 105 | 63.1 | co. gy. s.... | Rare. |
| 15078 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E..... | 170 | ....... | s., p......... | Rare. |
| 15086 | U.S.N.M. | 1 | .......... | Tara Island, Philippine Islands. | ....... | ....... | ............... | Rare. |

### NODOSARIA SCALARIS (Batsch), var. SEPARANS H. B. Brady.

*Nodosaria scalaris*, var. *separans* H. B. Brady, Rep. Voy. *Challenger*, *Zoolog* vol. 9, 1884, p. 511, pl. 64, figs. 16–19.

*Description.*—Variety with the last-formed chambers, one or mor remote, the neck of the previous chamber exposed between, th early chambers also often less inflated than in the typical.

*Distribution.*—This variety occurred at the following *Albatro* stations: D5201, in 544 fathoms (987 meters), Sogod Bay, souther Leyte, bottom temperature 52.8° F. (11.5° C.); D5254, Gulf of Dava 28 fathoms (51 meters), no bottom temperature; D5282, in 24 fathoms (454 meters), China Sea, off southern Luzon, bottom tem perature 47.4° F. (8.5° C.); D5630, in 569 fathoms (1,040 meters) south of Patiente Strait, and D5650, Gulf of Davao, 540 fathom (988 meters), bottom temperature 40.1° F. (4.5° C.).

The variety seems usually to be far less widely distributed than i the typical form.

*Nodosaria scalaris*, var. *separans*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 15087 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 544 | 52.8 | gy. s., m..... | Rare. |
| 12169 | U.S.N.M. | 2 | D5254... | 7 05 42 N.; 125 39 42 E.. | 28 | ....... | s., Co......... | Rare. |
| 12168 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | Rare. |
| 12170<br>12172 | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Rare. |
| 12171<br>12173 | U.S.N.M. | 6 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m......... | Few. |

### NODOSARIA SUBSCALARIS Cushman.

Plate 36, figs. 2 *a*, *b*.

*Nodosaria subscalaris* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654.

*Description.*—Test elongate, composed of few chambers, mucronate at the apical end, earlier chambers close-set, the later ones often somewhat separated, inflated, sutures depressed, surface ornamented with numerous (up to 40) longitudinal costae, apertural end with a thick, tapering neck with 9 or 10 prominent, plate-like costae extending from the upper end of the ornamentation of the body of the chamber to the apertural end of the neck; aperture small, rounded. Length up to 5 mm.

*Distribution.*—Type specimens (U.S.N.M. No. 9111) from *Albatross* station D5178, in 78 fathoms (143 meters), vicinity of Romblon, where the species was very abundant. It also occurred at D5277 in 80 fathoms (146 meters), China Sea vicinity of southern Luzon, bottom temperature 58.6° F. (14.7° C.).

This species differs from typical *N. scalaris* in the apertural characters especially, our species having a stout conical neck with very prominent longitudinal costae, while typical *scalaris* has a much narrower cylindrical neck with annular raised costae. This character is constant in the two species, as can be seen in specimens where the chambers are separated and the apertural characters of several chambers can be studied. The two species also do not occur mixed at the same station.

The apertural ornamentation and general characters suggest very strongly that of *Lagena striata* (d'Orbigny), var. *haidingeri* (Czjzek).[15]

*Nodosaria subscalaris—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 9111<br>1225 | U.S.N.M. | 10 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | 75.7 | fne. s........ | Common. |
| 1224 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Rare. |

### NODOSARIA SUBSCALARIS Cushman, var. PAUCI-COSTATA Cushman.

Plate 36, figs. 3, 4.

*Nodosaria subscalaris* CUSHMAN, var. *pauci-costata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654.

*Description.*—Variety differing from the typical in the lesser number of costae (12–25) and in the apertural characters which in the variety consist of a stout nearly cylindrical neck, with about 15 costae, which are continuations of the costae of the body portion.

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[15] Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, pl. 7, fig. 6.

*Distribution.*—Type specimens (U.S.N.M. No. 9112) from *Albatros* station D5152, in 34 fathoms (62 meters), Tawi Tawi group, Sul Archipelago. It has also occurred at D5217, in 105 fathoms (193 me ters), between Burias and Luzon, bottom temperature 63.1° F (17.2° C.); and D5133, in 38 fathoms (70 meters), Sulu Sea, off western Mindanao.

In the variety the reduction in number of the costae of the bod portion of the chamber is accompanied by an increase in the numbe of the costae of the apertural neck and by the difference in shape c the neck as well.

*Nodosaria subscalaris, var. pauci-costata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 12232 | U.S.N.M. | 2 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Few. |
| 15284 | U.S.N.M. | 4 | | | | | | |
| 12296 | U.S.N.M. | 10 | D5152... | 5 23 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Common. |
| 15285 | U.S.N.M. | 6 | | | | | | |
| 12233 | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s..... | Rare. |

### NODOSARIA MILLETTII Cushman.

Plate 36, fig. 5.

*Nodosaria millettii* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654.
*Nodosaria scalaris*, var. *separans* MILLETT, Journ. Roy. Micr. Soc., 1902, p. 52 pl. 11, figs. 11, 12 (not var. *separans* H. B. BRADY).

*Description.*—Test elongate, nodose, consisting of few chamber the early ones close-set, the latter ones remote, chambers pyriforn or elongate-elliptical in side view, very finely costate, the basal portion sometimes slightly hispid, apertural necks very long and slender, aperture with a phialine lip.

Length up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9113) from *Albatros* station D5281, in 201 fathoms (368 meters), China Sea, off souther Luzon, bottom temperature 50.4° F. (10.2° C.).

This species found by Millett in this same general region, but farther south, seems to differ materially from *N. scalaris*, var. *separans* The appearance of the test is at once different, more graceful, mor transparent, and very much more delicate and finer in its surfac markings. The form of the chamber is also much longer and mor elliptical, the neck more slender, and the chambers more remote while the end of the chamber, instead of having radiating slits as i var. *separans* and *scalaris*, has a definite, entire, phialine lip.

*Nodosaria millettii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Rare. |

### NODOSARIA LEPIDULA Schwager.

Plate 36, fig. 6.

*Nodosaria lepidula* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 210, pl. 5, figs. 27, 28.

*Description.*—Test elongate, straight, tapering gradually to the acute initial end, chambers numerous, about as long as wide, chambers well separated by deep sutures, wall with an ornamentation consisting of a ring of short costae or spines about the widest portion of the chamber, aperture with a phialine lip, with a flange below the extreme top.

Length up to 2 mm.

*Distribution.*—Specimens were common at *Albatross* station D5236, in 494 fathoms (903 meters), Pacific Ocean, off east coast of Mindanao, bottom temperature 41.2 ° F. (5.1° C.).

Some of the figures referred by Brady to *Sagrina* seem to belong to this species. Our specimens were nearly identical in all characters with those figured by Schwager from the Nicobar Islands.

*Nodosaria lepidula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 6 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Common. |

### NODOSARIA LEPIDULA Schwager, var. HISPIDULA Cushman.

Plate 36, fig. 7.

*Nodosaria lepidula* SCHWAGER, var. *hispidula* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 654.

*Description.*—Test differing from the typical in its larger size and the ornamentation, which in the variety consists of a series of interrupted fine costae and hispid roughenings of the surface over nearly the whole surface of the chamber.

Length up to 3 mm.

*Distribution.*—Type specimens (U.S.N.M. No. 9114) were found with the typical in considerable numbers at *Albatross* station D5236.

*Nodosaria lepidula*, var. *hispidula*—*Material examined.*

| Cat-No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 9114 | U.S.N.M. | ...... | D5236... | 8° 50′ 45″ N.; 126° 26′ 52″ E.. | 494 | °F.<br>41.2 | fne. gy. s..... | Common. |

### NODOSARIA SUBSTRIATULA Cushman.

Plate 36, figs. 8, 9; plate 52, figs. 7–9.

*Nodosaria subcanaliculata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 512, pl. 64, figs. 23, 24 (not *Dentalina subcanaliculata* Neugeboren).

*Nodosaria substriatula* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 655.

*Description.*—Test usually consisting of four chambers, the proloculum with a globular body, an apical spine, and with definite, longitudinal costae; the second chamber much more elongate, flask-shaped with a long neck; when partially covered by the third chamber becoming subcylindrical, ornamented like the proloculum; third chamber still more elongate, with a long neck, the surface ornamentation consisting of short, broken, longitudinal striae; the fourth chamber similar but remote, a large part of the neck between the two chambers visible; final chamber with the apertural neck long and slender, smooth; the apertural end with four or more flange-like costae extending up and beyond the aperture and incurving somewhat over the aperture.

Length up to 2 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9115) from *Albatross* station D5123, in 283 fathoms (517 meters), east coast of Mindanao. Specimens also were obtained in material from D5112, in 177 fathoms (324 meters), China Sea, off southern Luzon, bottom temperature 52.4° F. (11.3° C.); D5120, in 393 fathoms (719 meters), off Balayan Bay, bottom temperature 43.7° F. (6.5° C.); D5122, east coast of Mindoro, 220 fathoms (404 meters), and D5123, same locality, 283 fathoms (517 meters); D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); D5260, off southeastern Mindoro, 234 fathoms (428 meters), bottom temperature 51.4° F. (10.7° C.); D5284, in 422 fathoms (775 meters), China Sea off southern Luzon, bottom temperature 42.3° F. (5.7° C.); D5300, in 265 fathoms (485 meters), same region, and D5420, in 127 fathoms (233 meters), between Cebu and Bohol, bottom temperature 59.0° F. (15° C.).

Brady had this species, apparently a single specimen, from 420 fathoms (728 meters) off Tahiti. He referred it provisionally to a species described by Neugeboren from the Miocene of Transylvania. His wording is interesting:

> Under the name *Dentalina subcanaliculata*, Neugeboren has figured two slender, curved, Nodosaria shells, which are characterized by their numerous segments, straight sutures, and a peculiar surface-ornament consisting of short, broken, longitudinal striae. The specimen represented in Pl. LXIV, figs. 23, 24 [*Challenger* Report], exhibits the same kind of external marking; and as the test is manifestly abnormal in point of form, it may be treated provisionally, in the absence of other indications of its affinity, as an aberrant modification of the species referred to.

With the single specimen at his disposal little else could be done by Brady, and certainly from a single specimen it might appear, as he says, that "the test is manifestly abnormal in point of form." However, I have had a considerable number of specimens from the above localities and the form is more than usually constant. The figure given by Brady is so well drawn that it might represent one of the specimens I have had. His specimen, however, did not have its aperture in complete preservation, as have a portion of those which I have been fortunate enough to obtain.

This is certainly a rather unique species in many ways, and is apparently rather widely distributed in the Indo-Pacific region, although it is a delicate one and easily broken.

*Nodosaria substriatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | |
| | | | D5120... | 13 45 30 N.; 120 20 15 E.. | 393 | 43.7 | gn. m., s.... | |
| [illegible] | U.S.N.M. | 1 | D5122... | 13 21 30 N.; 120 30 33 E.. | 220 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5123... | 13 12 45 N.; 121 38 45 E.. | 283 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5280... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Rare. |
| | | | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | |
| [illegible] | U.S.N.M. | 10 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Common. |
| [illegible] | U.S.N.M. | 1 | D5420... | 9 49 35 N.; 123 45 00 E.. | 127 | 59.0 | ............. | Rare. |

### NODOSARIA PAUCILOCULATA Cushman.

Plate 36, figs. 10–12.

*Nodosaria pauciloculata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 655.

*Description.*—Test nodose, composed of few chambers, usually not more than five, two or three closely set, later ones remote, inflated, sutures even in the early chambers much depressed, wall ornamented by longitudinal costae, few and large, usually limited to the middle portion of the chamber and becoming obsolete toward each end, neck long, swollen toward the top, then again rapidly contracted to the aperture; in the early chambers the neck with costae, in later ones with the costae limited to the last tapering portion near the aperture.

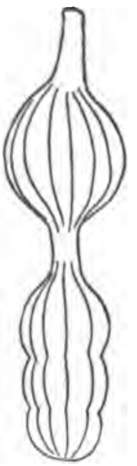

FIG. 8.—NODOSARIA PAUCILOCULATA, VAR. LUZONENSIS, NEW VARIETY. FRONT VIEW, × 100. FROM STATION D5220.

Length, up to 3.5 mm.

*Distribution.*—Type specimens (U.S.N.M. No. 9116) from *Albatross* station D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte Island, bottom temperature, 52.8° F. (11.5° C.).

Specimens were frequent at the type station, also at D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature, 49.3° F. (9.6° C.); D5371, in 83 fathoms (151 meters), vicinity of Marinduque Island; and D5538, in 256 fathoms (468 meters), between Negros and Siquijor, bottom temperature, 53.3° F. (11.8° C.).

This species very quickly loses its close-set character, but two and occasionally three chambers being so arranged, after which the chambers are at once remote. The costae, limited to the middle area of the chamber and the very characteristic shape of the apertural neck, are distinguishing characters. It is usually mucronate at the apical end. A young stage with three chambers is shown, as well as two adult five-chambered specimens, one with three, the other with two close-set early chambers.

*Nodosaria pauciloculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12294 | U.S.N.M. | 2 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Rare. |
| 12211 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| 9116 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Frequent. |
| 15287 | U.S.N.M. | 1 | | | | | | |
| 12213 | U.S.N.M. | 2 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Rare. |
| 12293 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Rare. |
| 12214<br>12215 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Frequent. |
| 12216 | U.S.N.M. | 4 | D5371... | 13 49 40 N.; 121 40 15 E.. | 83 | ....... | gn. m....... | Frequent. |
| 12210 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Rare. |
| 14925 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Rare. |

### NODOSARIA PAUCILOCULATA Cushman, var. LUZONENSIS, new variety.

*Description.*—Test differing from the typical in having three closely set chambers followed by a single one, somewhat remotely placed; earlier chambers without the neck costae continuous.

*Distribution.*—Type specimen (U.S.N.M. No. 15288), from *Albatross* station D5220, between Marinduque and Luzon, 50 fathoms (91 meters).

This variety was common at this station, and seems to replace the typical, which was not found here.

*Nodosaria pauciloculata*, var. *luzonensis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 8 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Common. |

### NODOSARIA SUBLINEATA H. B. Brady.

Plate 37, fig. 1.

*Nodosaria hispida*, var. *sublineata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 508, pl. 63, figs. 19–22.

*Description.*—Test elongate, nodose, composed of few chambers, the early ones sometimes close-set, initial end mucronate, wall ornamented by longitudinal costae, more or less broken transversely, apertural neck cylindrical, with annular or spiral costae.

Length up to 6 mm.

*Distribution.*—Specimens referred to this species occurred at *Albatross* stations D5100, China Sea, off southern Luzon, 35 fathoms (66 meters), no bottom temperature; D5586, in 347 fathoms (635 meters), near Sibuko Bay, Borneo, bottom temperature 44° F (6.6° C.); and D5650, in 540 fathoms (988 meters), Gulf of Boni, bottom temperature 40.1° F. (4.5° C.). At the latter station the specimens were very numerous.

These specimens in some ways differ from those figured by Brady, but in the main seem to have the characters which he notes. Their relation to *N. hirsuta* does not seem to be close, some of the specimens suggesting *N. scalaris* much more closely. The specimen figured here shows the extreme form, with several close-set chambers and the costae but slightly broken. From this extreme the specimens range toward those figured by Brady. This possibly may prove not to be Brady's species, but a new one.

*Nodosaria sublineata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 10 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Common. |

### NODOSARIA PERVERSA Schwager.

Plate 37, fig. 2.

*Nodosaria perversa* SCHWAGER, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 21 pl. 5, fig. 29.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, 512, pl. 64, figs. 25–27.

*Description.*—Test elongate, subcylindrical, chambers compan tively few, inflated; sutures depressed, initial end broadly rounde wall with numerous longitudinal costae, last-formed chambers us ally smooth; apertural end with a short neck with a definite phiali lip.

Length 1 to 1.5 mm.

*Distribution.*—Specimens identical with Schwager's species o curred at *Albatross* station D5285, in 272 fathoms (498 meters China Sea near southern Luzon, bottom temperature 46.5° F (8° C.); and D5311, in 88 fathoms (161 meters), China Sea, vicinit of Hongkong.

Schwager's specimens were from the Nicobar Islands, the fossi of which, as has already been noted, are closely related to the prese foraminiferal fauna of the Philippines. Brady's specimens we from off the Ki Islands, southwest of New Guinea, the fauna of whi is also related closely to the fauna of the Philippines.

The specimens figured by Silvestri are closely allied if not identic with this species.[16]

Egger records this species from the west coast of Australia, Cha man from east of Tasmania in 1,122 fathoms, and Dakin as rare the Gulf of Manaar, Ceylon.[17]

*Nodosaria perversa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12291 | U.S.N.M. | 1 | D5257... | 7 22 12 N.; 124 12 15 E.. | 28 | ....... | m............ | Rare. |
| 12187 | U.S.N.M. | 1 | D5285... | 13 39 36 N.; 120 32 55 E.. | 272 | 46.5 | sft. m........ | Rare. |
| 12292 | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| 15293 | | 1 | | | | | | |

### NODOSARIA SUBPERVERSA Cushman.

Plate 37, fig. 3.

*Nodosaria subperversa* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 655.

*Description.*—Test elongate, subcylindrical, composed of seve chambers, proloculum larger than the succeeding chambers; chambers close-set, the breadth being much greater than the leng sutures deeply constricted, wall finely marked by longitudinal striations, aperture without a neck.

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[16] Atti dell'Accad. Gioenia di Sci. Nat. di Catania, ser. 3, vol. 7, 1872, p. 65, pl. 4, figs. 148–158.

[17] Egger, Abh. Kön. Bay. Akad. München, Cl. II, vol. 18, 1893, p. 152, pl. 11, fig 42. Chapman, Res. *Endeavor*, vol. 3, pt. 1, 1915, p. 23. Dakin, Ceylon Pearl-Oyster Fisheries, Suppl. Repts., 1906, p. 235.

Length up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9117) from *Alba-* station D5236, in 494 fathoms (903 meters), Pacific Ocean, east st of Mindanao, bottom temperature 41.2° F. (5.1° C.).

This species differs from *N. perversa* Schwager in its broader, shorter mbers and its very much finer ornamentation, as well as the of a definite apertural neck and the mucronate character of proloculum.

*Nodosaria subperversa—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |

## NODOSARIA LAEVICOSTATA Cushman.

Plate 37, fig. 4.

*Nodosaria laevicostata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 656.

*Description.*—Test elongate, arcuate, composed of but few chambers, early ones more or less rounded, closely set, ornamented with longitudinal costae, later chambers pyriform, with the last-formed chamber often remote, wall smooth; apertural end tapering into an apertural neck.

Length up to 2 mm.

*Distribution.*—Type specimens (U.S.N.M. No. 9118) from *Alba-* station D5178, in 78 fathoms (143 meters), near Romblon.

This is a peculiarly formed species, the early, close-set chambers costate being nearly in a straight line, while the later smooth ones considerably angled. None of the specimens seen had more than chambers, the first three or four being close set and costate.

*Nodosaria laevicostata—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |

### NODOSARIA RAPHANUS (Linnaeus).

Plate 37, figs. 5-7.

"Cornu Hammonis erectum striatum" PLANCUS, Conch. Min., 1739, p. 15, pl 1, fig. 6.

"Orthoceras minimum" etc., GAULTIERI, Index Test., 1742, pl. 19, fig. L.

*Nautilus raphanus* LINNAEUS, Syst. Nat., ed. 12, 1767, pp. 1164, 283; (Gmelin' ed. 13, 1788, p. 3372, No. 16.

*Orthocera raphanus* LAMARCK, Anim. sans Vert., vol. 7, 1822, p. 593, No. 1; Tab Encycl. et Méth., pl. 465, figs. 2*a*, *b*, *c*.

*Nodosaria raphanus* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 1859, p. 477.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, 512, pl. 64, figs. 6-10.—CUSHMAN, Bull. U. S. Nat. Mus., pt. 3, 1913, p. 59, pl 26, figs. 12, 13.

Excellent specimens of this species were obtained at numerou stations well scattered throughout the region, but mostly in mediu depths. The range of depths is from 80 to 554 fathoms (146 to 1,012 meters), with an average of 229 fathoms (419 meters), and the botto temperatures from 53° F. to 58.6° F (11.7° C. to 14.7° C.), wit an average of 55.6° F. (13.1° C.).

Some of the largest specimens measure as much as 25 mm., an often specimens show considerable constriction, usually toward th apertural end, but also occasionally in the middle of the test. Thi is one of the finest species in the region.

*Nodosaria raphanus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12252 | U.S.N.M. | 2 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 54.3 | gn. m........ | Rare. |
| 12251 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m.... | Rare. |
| 15088 | U.S.N.M. | 2 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ........ | s. m.......... | Few. |
| 12248 | U.S.N.M. | 3 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Common. |
| 12249<br>12250 | U.S.N.M. | 2 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s......... | Rare. |
| 15089 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s.............. | Rare. |
| 15090 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ........ | s. br. Co .... | Rare. |
| 12247 | U.S.N.M. | 3 | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ........ | bk. s.......... | Frequent. |
| 15091 | U.S.N.M. | 1 | D5370... | 13 44 15 N.; 121 42 30 E.. | 159 | 54.3 | sft. m......... | Rare. |
| 15092 | U.S.N.M. | 6 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ........ | gy. m......... | Common. |
| 15093 | U.S.N.M. | 1 | D5382... | 13 15 20 N.; 122 45 30 E.. | 128 | ........ | m.............. | Rare. |
| 12246 | U.S.N.M. | 1 | D5454... | 13 12 00 N.; 123 50 30 E.. | 153 | ........ | ................ | Rare |
| 15094 | U.S.N.M. | 1 | D5523... | 8 43 44 N.; 123 27 35 E.. | ........ | ........ | ................ | Rare |
| 15095 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m......... | Rare. |
| 15096 | U.S.N.M. | 1 | D5650... | 4 54 45 S.; 121 29 00 E.. | 540 | ........ | gn. m......... | Rare |

### NODOSARIA OBLIQUA (Linnaeus).

Plate 38, fig. 1.

"Orthoceras minimum" etc., GAULTIERI, Index Test., 1742, pl. 19, fig.

*Nautilus obliquus* LINNAEUS, Syst. Nat., ed. 12, 1767, p. 1163; (Gmelin's) 13, 1788, p. 3372, No. 14.

*Nodosaria* (*Dentalina*) *obliqua* PARKER and JONES, Ann. Mag. Nat. Hist., ser. vol. 3, 1859, p. 482.

*Nodosaria obliqua* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, 513, pl. 64, figs. 20-22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, 57, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 59, pl. 25, fig.

Beautiful specimens of this species are well distributed over the area occurring at numerous stations: Off western Bohol; Sogod Bay, southern Leyte; between Marinduque and Luzon; Gulf of Davao; east coast of Luzon, off northern Mindanao; between Siquijor and Bohol; between Negros and Siquijor; off Sibuko Bay, Borneo; and Bouro Island. The depth of these stations ranges from 100 to 700 fathoms (183 to 1,280 meters), average depth about 400 fathoms [illegible]2 meters). The bottom temperatures where given range from [illegible]° to 53.9° F. (6.1° to 12.1° C.), the average being 49.8° F. (9.8° C.). While occurring at a large number of stations this is not so well represented in numbers as are other species of the genus.

*Nodosaria obliqua—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 3 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| [illegible] | U.S.N.M. | 4 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.2 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5374... | 30 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m........... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy.m........ | Rare. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m....... | Frequent. |
| 13074 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |

### NODOSARIA VERTEBRALIS (Batsch).

Plate 38, figs. 2, 3; plate 40, fig. 2.

*Nautilus (Orthoceras) vertebralis* BATSCH, Conch. des Seesandes, 1791, p. 3, No. 6, pl. 2, figs. 6*a*, *b*.

*Nodosaria vertebralis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 514, pl. 63, fig. 35; pl. 64, figs. 11-14.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 312, pl. 57, fig. 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 60. pl. 32, fig. 1.

This is one of the most abundant species in the area, occurring at some stations, as D5201, off southern Leyte, in great abundance. The specimens are well developed and show the distinct character of the sutures very clearly. The last-formed chamber is often much more constricted than the preceding ones, especially in adult specimens. The distribution includes the coast of Romblon; Tanon Strait; east coast of Negros; Sogod Bay, southern Leyte; off Burias; off Marinduque; Gulf of Davao; off southern Mindoro: Palawan Passage; between Samar and Leyte; Ragay Gulf, Luzon; and at various places off the coast of Mindanao.

The species seems to be confined to the Philippine Archipel proper as far as the material examined shows, and to warm wat The depths range from 26 to 554 fathoms (48 to 1,012 meters), v the average 129 fathoms (236 meters), and the bottom temperat from 52.4° to 63.1° F. (11.3° to 17.2° C.), average 57.2° F. (14° At the deepest station, 554 fathoms (1,012 meters), the bottom t perature was 52.8° F. (11.5° C.), a high temperature for this deptl

*Nodosaria vertebralis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abund |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12153 | U.S.N.M. | 3 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s......... | Few. |
| 12150 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. m........ | Few. |
| 12152 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Rare. |
| 15045 | U.S.N.M. | 1 | D5132... | Island off Panabutan Point, N. 15 W. 0.3 mi. E. | 26 | ....... | gn. m., s.... | Rare. |
| 15046 | U.S.N.M. | 6 | D5133... | Island off Panabutan Point, N. 52 E. 1.05 mi. E. | 38 | ....... | gn. m., s.... | Freque |
| 15047 | U.S.N.M. | 10+ | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s........ | Abund |
| 12158 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 15048 | U.S.N.M. | 3 | D5189... | 9 56 30 N.; 123 15 00 E.. | 300 | 62.8 | gn. m........ | Few. |
| 12151 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| 15049 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| 11601 | U.S.N.M. | 10 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Abund |
| 12157 | | | | | | | | |
| 15050 | U.S.N.M. | 2 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft. m....... | Few. |
| 15051 | U S N.M. | 7 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Freque |
| 15052 | U.S.N.M. | 5 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Few. |
| 15053 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh... | Rare. |
| 12155 | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co. s., m.... | Frequ |
| 15064 | U.S.N.M. | 3 | | | | | | |
| 15055 | U.S.N.M. | 9 | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ....... | co. s......... | Freque |
| 12154 | U.S.N.M. | 5 | D5382... | 13 15 20 N.; 122 45 30 E.. | 128 | ....... | m............ | Few. |
| 15056 | U.S.N.M. | 3 | D5481... | 10 27 30 N.; 126 17 10 E.. | ........ | ....... | s., sh., g..... | Few. |
| 12156 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m........ | Rare. |
| 15057 | U.S.N.M. | 1 | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............ | Rare. |
| 15058 | U.S.N.M. | 7 | D5592... | 4 12 44 N.; 118 27 44 E.. | 306 | 43.3 | gn. m........ | Comm |

## NODOSARIA SPIROSTRIOLATA Cushman.

Plate 38, fig. 4.

*Nodosaria spirostriolata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 65

*Description.*—Test much elongate, very slightly tapering tow the initial end, which is broadly rounded, chambers numero short, elliptical in side view, sutures but slightly depressed, surf ornamented throughout with numerous (40–50) fine longitudi costae, spirally arranged; apical end without a neck, broadly round

Length 10 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9119) and oth from *Albatross* station D5236, in 494 fathoms (903 meters), Pac Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° It has also occurred at D5178, off Romblon, 78 fathoms (143 mete

This is a large and striking species, with its very numerous spiral costae giving it a unique appearance.

[illegible]—[illegible]

| Cat. No. | Coll. of— | No. of specimens | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | [illegible] |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| [illegible] | U.S.N.M. | 7 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

## [illegible]

Plate [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] pl. [illegible], fig. [illegible].—H. B. Brady, Rep. Voy. Challenger, Zoology, [illegible], p. [illegible], pl. [illegible], figs. [illegible].

**Description.**—Test elongate, [illegible], [illegible], [illegible] a few chambers, four to six, gradually increasing in size as added, [illegible] cylindrical neck tapering and [illegible] and distinctly [illegible].

Length up to 2 mm.

**Localities.**—One specimen, which was [illegible], was obtained [illegible] Albatross station [illegible], in [illegible] fathoms, [illegible], off east coast of Mindanao, bottom temperature [illegible].

This species was described by Schwager from the upper Pliocene of Kar Nicobar. The *Challenger* specimens recorded by Brady were from the Ki Islands. Both the upper Pliocene of Kar Nicobar and the foraminiferal fauna of the Ki Islands seem to be closely related to the recent foraminiferal fauna of the Philippines.

[illegible]—Albatross [illegible].

| Cat. No. | Coll. of— | No. of specimens | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | [illegible] |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

## NODOSARIA [illegible] d'Orbigny.

Plate [illegible], figs. [illegible].

[illegible] *quasi hispida* " Soldani, Testaceographia, vol. [illegible], p. [illegible], pl. [illegible], fig. P.

[illegible] *hispida* " Soldani, Testaceographia, vol. 2, 1798, p. [illegible], pl. [illegible], figs. [illegible] A, B.

*Nodosaria hirsuta* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. [illegible], No. [illegible].—Cushman, Bull. [illegible], U. S. Nat. Mus., pt. 3, 1913, p. 63, pl. [illegible], fig. 8.

*Nodosaria hispida* d'Orbigny, Foram. Foss. Vienne, 1846, p. 35, pl. 1, figs. [illegible].—H. B. Brady, Rep. Voy. Challenger, Zoology, vol. 9, 1884, p. [illegible], pl. 63, figs. [illegible]-16.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 311, pl. 57, fig. 1.

The typical form of this species occurred at two stations—D5201, Sogod Bay, off southern Leyte, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.), and D5259, off northwestern Panay, 312 fathoms (571 meters), bottom temperature 49.3° F. (9.6° C.).

*Nodosaria hirsuta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12179 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Rare. |
| 12174 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy.m.,glob.. | Rare. |

### NODOSARIA HIRSUTA d'Orbigny, var. ACULEATA d'Orbigny.

Plate 38, figs. 7, 8.

*Nodosaria aculeata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 35, pl. 1, figs. 26, 27.

*Description.*—Variety with the test covered with coarse aculeate spines.

*Distribution.*—Specimens of this species occurred at several stations: Sogod Bay, southern Leyte; off northwestern Panay; China Sea, vicinity of southern Luzon; Palawan Passage, off northern Mindanao, and north of Tawi Tawi. The depth of these stations ranged from 201 to 554 fathoms (368 to 1,012 meters), average depth 356 fathoms (651 meters). Bottom temperatures ranged from 49.3° to 56.4° F. (9.6° to 13.5° C.), average temperature 52.2° F. (11.2° C.).

*Nodosaria hirsuta var. aculeata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12176 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.m...... | Few. |
| 12179 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 302 | 49.3 | gy.m........ | Rare. |
| | | | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk.gy.s..... | Frequent. |
| 12180 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s......... | Rare. |
| 12175 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ...... | ...... | ............... | Rare. |
| 12178 | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s.sh......... | Rare. |

## Genus LINGULINA d'Orbigny, 1826.

### LINGULINA COSTATA d'Orbigny.

Plate 43, figs. 2*a*, *b*.

*Lingulina costata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 62, pl. 3, figs. 1-5.—CARPENTER, PARKER, and JONES, Introd. Foram., 1862, pl. 12, fig. 1.—KARRER, *Novara*-Exped., Geol. Theil., vol. 1, 1864, p. 75, pl. 16, fig. 3.—SCHWAGER, Boll. R. Com. Geol. Ital., vol. 8, 1877, p. 25, pl., fig. 7.

*Description.*—Test composed of a few chambers in a uniserial arrangement, much overlapping, rapidly increasing in size as added, whole test ovate, broadest toward the apertural end, slightly carinate laterally; surface ornamented by a series of longitudinal costae, those of each chamber independent of the adjacent ones; aperture long and narrow.

Diameter about 2 mm.

*Distribution.*—The figured specimen was obtained from *Albatross* station D5318, in 340 fathoms (622 meters), China Sea, vicinity of Formosa.

This is the first record for this species in the North Pacific.

*Lingulina costata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co..... | Rare. |

### LINGULINA GRANDIS Cushman.

Plate 43, figs. 1*a*, *b*.

*Lingulina grandis* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 656.

*Description.*—Test large, compressed, early portion and in some specimens all but the final chamber distinctly keeled; chambers about eight in number, broad and short, somewhat inflated; sutures depressed, not noticed on the keel; wall smooth and shining, yellowish-brown or reddish-brown in color; aperture a very elongate slit extending half the width of the test.

Length up to 6 mm.; width 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9120) from *Albatross* station, D5268, in 170 fathoms (311 meters), Batangas Bay. Specimens were also obtained in material from D5178, in 78 fathoms (143 meters), vicinity of Romblon; D5217, in 105 fathoms (193 meters), between Burias and Luzon, bottom temperature 63.1° F. (17.2° C.); and D5589, in 260 fathoms (476 meters), Sibuko Bay, Borneo, bottom temperature 45.7° F. (7.6° C.).

This species in some ways resembles *L. carinata*, but it is several times as large and is differently shaped.

*Lingulina grandis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne. gy. s., gy. m. | Rare. |

## Genus FRONDICULARIA Defrance, 1824.

There is a considerable development of this genus in the general region of the Philippines, probably better than in most recent gatherings, unless in the *Challenger* material dredged off the Ki Islands.

### FRONDICULARIA INAEQUALIS Costa.

Plate 40, figs. 5, 6.

*Frondicularia inaequalis* Costa, Mem. Accad. Sci. Napoli, vol. 2, 1855, p. 372, pl. 3, fig. 3.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 521, pl. 66, figs. 8–12.

*Description.*—Test compressed, irregularly elliptical, initial end usually narrow, bluntly pointed, proloculum subspherical, following chambers coiled in part or not at all, quickly giving place to typical V-shaped frondicularian chambers, highest in the center, thence gradually tapering to the pointed lower ends; test occasionally with a slight peripheral keel; sutures slightly depressed; aperture circular in the center of the periphery of the last-formed chamber; surface of test smooth and unornamented; wall translucent, thin.

Length 0.5 to 2 mm.

*Distribution.*—This delicate species has been previously recorded from the Atlantic and South Pacific, but not from the North Pacific. In the South Pacific, Brady in the *Challenger* Report recorded it from off New Zealand, 275 fathoms (503 meters); off Raine Island, Torres Strait, 155 fathoms (283 meters), and near the Ki Islands, 129 and 580 fathoms (236 and 1,061 meters). The two latter localities have already been mentioned as faunally closely related to the Philippines, so that it is natural to find *F. inaequalis* in this Philippine material. It has occured at D5123, east coast of Mindoro, in 283 fathoms (517 meters), bottom temperature not given; and D5652, Gulf of Boni, 525 fathoms (927 meters), bottom temperature 41.2° F. (5.1° C.).

*Frondicularis inaequalis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15334 | U.S.N.M. | 1 | D5123... | 13 12 45 N.; 121 38 45 E... | 283 | ....... | gn. m....... | Rare. |
| 15335 | U.S.N.M. | 1 | D5652... | 4 35 00 S.; 121 23 06 E... | 525 | 41.2 | gn. m....... | Rare. |

### FRONDICULARIA PHILIPPINENSIS, new species.

Plate 39, figs. 1–3.

*Description.*—Test much compressed, comparatively large, roughly diamond-shaped, initial end bluntly pointed, the greatest breadth usually at about the lower third or fourth of the length, basal end typically with a thin and narrow keel irregular at the edge or where well developed with several sharp toothlike processes; early chambers usually somewhat coiled, later ones typically bilateral and narrow not changing greatly in height, sutures usually nearly flush, of slightly clearer shell material; specimens occasionally flabelline throughout, last-formed chamber often with a square edge, with the peripheral angles slightly raised and the apertural end projecting in a slight knob, somewhat rounded; surface for the most part smooth and polished, the earlier chambers, however, typically ornamented with a series of irregular knobs or bosses with numerous irregular, short raised costae, running generally lengthwise of the test; aperture radiate, terminal.

Length up to 6 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 15327) from D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.). It has also occurred in the following localities: D5259, off northwestern Panay; D5300, China Sea, vicinity southern Luzon; D5301, same locality, 208 fathoms (381 meters); D5425, Jolo Sea; D5429, eastern Palawan and vicinity; D5449, east coast of Luzon, San Bernardino Strait to San Miguel Bay.

*Frondicularia philippinensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15327 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 15328 | U.S.N.M. | 9 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Commom. |
| 15329 | U.S.N.M. | 2 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| 15330 | U.S.N.M. | 4 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Few. |
| 15331 | U.S.N.M. | 2 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| 15332 | U.S.N.M. | 2 | D5429... | 9 41 30 N.; 118 50 22 E... | 766 | ....... | gn. m....... | Rare. |
| 15333 | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E... | 300 | ....... | .............. | Rare. |

### FRONDICULARIA ANNULARIS d'Orbigny.

Plate 39, fig. 5.

*Frondicularia annularis* d'ORBIGNY, Foram. Foss. Vienne, 1846, p. 59, pl. 2, figs. 44-47.

*Description.*—Test oval, much compressed, greatest width at the base, proloculum oval or elliptical, next few chambers not extending back as far as their predecessors, but soon equaling or exceeding the length backward; outer angle very broadly rounded, apertural end squarely truncated or sometimes with a projecting or rounded apertural knob; sutures but slightly depressed; early portions of test with numerous fine longitudinal raised costae parallel to the long axis of the test; remainder of the test smooth and polished.

Length equal to the diameter, about 3 mm.

*Distribution.*—The following localities are represented: East coast of Mindoro; China Sea off Formosa; Ragay Gulf, Luzon; and between Cebu and Leyte. It was not noted in the region to the southward. D'Orbigny's specimens were from the Miocene of Baden.

*Frondicularia annularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12440 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Rare. |
| 12441 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 12437 | U.S.N.M. | 5 | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s......... | Common. |
| 12439<br>15325 | U.S.N.M. | 8 | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m........... | Common. |
| 12443 | U.S.N.M. | 1 | D5408... | 10 40 15 N.; 124 15 00 E... | 159 | 55.4 | gn. m....... | Rare. |

### FRONDICULARIA ANNULARIS d'Orbigny, var. LONGISTRIATA, new variety.

Plate 39, fig. 6.

*Description.*—Variety differing from the typical in the form, which is much more elongate, narrower, the initial end pointed, and all or nearly all of the surface covered with the fine longitudinal costae.

*Distribution.*—Type specimen (U.S.N.M., No. 15326) from D5110, China Sea off southern Luzon, in 135 fathoms (247 meters), bottom temperature 59.0° F. (15° C.). It also occurred at D5201, Sogod Bay, southern Leyte Island, in 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.).

Chapman[18] records a species of *Frondicularia* from off Great Barrier Island, Australia, as *F. reussi* Karrer, with the following notes:

> Three examples of an ovate, striated *Frondicularia* were found off Great Barrier Island. They are almost exactly matched by Karrer's figured specimen from the Miocene of the Vienna basin. The narrowest of our specimens may also be compared with Karrer's *F. sculpta*, figured on the same plate as the above. These shells are obviously of the same type as the earlier-described *F. annularis* of d'Orbigny from the Miocene of Baden; this, however, is a generally broader form.
>
> This appears to be the first occurrence of *F. reussi* in recent deposits.

Specimens, both of this form and the more typical form of *F. annularis*, were found in the Philippine material, but all are here referred to *F. annularis*, var. *longistriata*. It may be that Chapman's material is distinct from the Philippine material, but they appear to be very similar.

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[18] Trans. New Zealand Inst., vol. 38, 1905, p. 95, pl. 3, fig. 7.

*Frondicularia annularis*, var. *longistriata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk.gy.m.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ...... | ...... | ............. | Rare. |

### FRONDICULARIA PLICATA, new species.

Plate 39, fig. 4; plate 40, fig. 4.

*Description.*—Test elongate, compressed, usually flabelline, border thickened, sutures irregular, periphery rounded, whole test irregularly triangular in shape; later chambers not extending back to the line of the previous chamber base, surface somewhat concave, smooth except for the initial portion, and the basal portion of the growing edge, which has a few large, irregular, rounded raised costae; aperture terminal, slightly projecting.

Length up to 4 mm. or more.

*Distribution.*—Type specimen (U.S.N.M. No. 15336) from D5301, China Sea, vicinity Hongkong, 208 fathoms (381 meters), bottom temperature 50.5° F. (10.2° C.).

The specimen figured (pl. 39, fig. 4) may be a smooth form of this species. It is from D5584, off Sibuko Bay, Borneo, and vicinity, 292 fathoms (535 meters), bottom temperature 44.3° F. (6.8° C.). It is however, much larger, being nearly 8 mm. in length.

*Frondicularia plicata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15336 | U.S.N.M. | 2 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy.m.,s..... | Rare. |
| 15337 | U.S.N.M. | 1 | D5584... | 4 17 40 N.; 118 57 42 E... | 292 | 44.3 | fne.s.,gy.m. | Rare. |

## Genus TRIPLASIA Reuss, 1854.

### TRIPLASIA TRICARINATA (d'Orbigny).

*Vaginulina tricarinata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 258, No. 4; Modèles, No. 4.

*Rhabdogonium tricarinatum* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 525, pl. 67, figs. 1–3.

*Triplasia tricarinata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 62, pl. 39, fig. 2.

Only two stations have been recorded in the Philippine material I have examined from which this species has been obtained. These are *Albatross* stations D5301, in 208 fathoms (381 meters), China Sea, vicinity of Hongkong, bottom temperature 50.5° F. (10.2° C.); and D5638, in 517 fathoms (946 meters), entrance to Tifu Bay, Bouro Island.

*Triplasia tricarinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11902 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy.m.,s..... | Rare. |
| 11901 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy.s..... | Rare. |

## Genus CRISTELLARIA Lamarck, 1812.

### CRISTELLARIA CULTRATA (Montfort).

"Cornu Hammonis" PLANCUS, Conch. Min., 1760, p. 120, pl. 1, fig. 12.

"Nautili (*Lenticulae marginatae*)" SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 54, pl. 33, fig. B.

*Robulus cultratus* MONTFORT, [?] Conch. Syst., vol. 1, 1808, p. 214, 54e genre.

*Robulina cultrata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 287, No. 1; Modèles, 1826, No. 82; Foram. Foss. Vienne, 1846, p. 96, pl. 4, figs. 14, 15.

*Cristellaria cultrata* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 344, pl. 13, figs. 17, 18; pl. 16, fig. 5.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 550, pl. 70, figs. 4, 5, 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 64, pl. 29, fig. 4.

This species is well distributed in the area, including not only the Philippine Archipelago, but the China Sea, and the area to the south, including Patiente Strait and Buton Strait.

The stations range in depth from 37 to 700 fathoms (68 to 1,280 meters), with the average depth 266 fathoms (486 meters), and the average of the bottom temperatures when given 49.1° F. (9.5° C.).

*Cristellaria cultrata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15255 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| 11864 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s..... | Few. |
| 11865 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| 11859 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 15256 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s..... | Rare. |
| 15257 | U.S.N.M. | 1 | D5291... | 13 29 40 N.; 121 00 45 E.. | 173 | 51.5 | fne. bk. s..... | Rare. |
| 11860 | U.S.N.M. | 5 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Few. |
| 11862 | U.S.N.M. | 2 | D5331... | 15 36 45 N.; 119 47 45 E.. | 178 | 54.7 | s., sh., m.... | Few. |
| 15258 | U.S.N.M. | 5 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m....... | Rare. |
| 11861 | U.S.N.M. | 5 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m....... | Few. |
| 11863 | U.S.N.M. | 3 | D5454... | 13 12 00 N.; 123 50 30 E.. | 153 | ....... | ............... | Few. |
| 15259 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |
| 15261 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Rare. |
| 15663 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |
| 15260 | U.S.N.M. | 10+ | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m....... | Common. |

### CRISTELLARIA CULTRATA (Montfort), var. DECORATA Cushman.

*Cristellaria cultrata* (Montfort), var. *decorata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 656.

*Description.*—Variety differing from the typical in the addition of a distinct type of ornamentation, consisting of a large umbilical knob above the umbilical region, and the sutures with costae which are gradually larger toward the periphery.

*Distribution.*—Type specimen (U.S.N.M. No. 9121) from *Albatross* station 5113 in 159 fathoms (290 meters), China Sea off southern Luzon. It also occurred at the following *Albatross* stations: D5121, in 108 fathoms (198 meters), east coast of Mindoro; D5222, in 195 fathoms (356 meters), between Marinduque and Luzon, bottom temperature 52.8° F. (11.5° C.); D5260, in 234 fathoms (428 meters), off southeastern Mindoro, bottom temperature 51.4° F. (10.7° C.); and D5590, in 310 fathoms (567 meters), Sibuko Bay, Borneo.

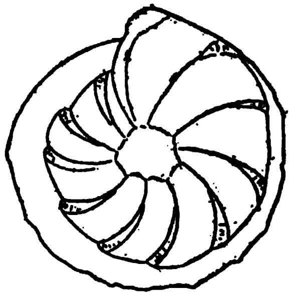

Fig. 9.—Cristellaria cultrata, var. decorata Cushman. Side view, × 50. From station D5113.

*Cristellaria cultrata*, var. *decorata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 4 | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m.... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Rare. |

### CRISTELLARIA RENIFORMIS d'Orbigny.

*Cristellaria reniformis* d'Orbigny, Foram. Foss. Vienne, 1846, p. 88, pl. 3, figs. 39, 40.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 539, pl. 70, figs. 3*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 65, pl. 30, fig. 4; pl. 33, fig. 1.

Single specimens referable to this species were found at the following *Albatross* stations: D5439, in 940 fathoms (1,719 meters), west coast of Luzon, bottom temperature 36.7° F. (2.6° C.); D5613, in 752 fathoms (1,375 meters), Gulf of Tomini, Celebes; and D5668 in 901 fathoms (1,648 meters), Macassar Strait, bottom temperature 38.2° F. (3.4° C.).

These stations are all in comparatively deep water, with a cold bottom temperature, and compare rather well in conditions with most of those recorded in the *Challenger* report for this species in these two respects.

*Cristellaria reniformis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11773 | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Rare. |
| 11770 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Rare. |
| 11771 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Rare. |

### CRISTELLARIA ARTICULATA (Reuss).

Plate 57, figs. 2–4.

*Robulina articulata* Reuss, Sitz. Akad. Wiss. Wien, vol. 48, 1863, p. 53, pl. 5, fig. 62.

*Cristellaria articulata* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 483.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 547, pl. 69, figs. 10–12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 65, pl. 31, fig. 1.

Although few specimens have occurred at any one station, nevertheless numerous stations have yielded records for this species: China Sea, off Luzon; Sogod Bay, southern Leyte; off western Luzon; between Luzon and Marinduque; eastern Palawan; between Leyte and Mindanao; between Samar and Leyte; between Siquijor and Bohol; north of Tawi Tawi; Gulf of Tomini, Celebes, and Molucca Sea. With the exception of the last, all these stations are within the Archipelago. The depths range from 24 to 766 fathoms (44 to 1,400 meters), with the average depth 368 fathoms (673 meters), the average bottom temperature being 53.9° F. (12.1° C.).

A figure is given of a very attenuate specimen which was uncoiled almost from the beginning. It is a rather unusual form for this species.

*Cristellaria articulata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11824 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m.... | Rare. |
| 11822 | U.S.N.M. | 1 | D5201 .. | 10 10 00 N., 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Rare. |
| 15224 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Rare. |
| 11823 | U.S.N.M. | 1 | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s.. sh., m.... | Few. |
| 11821 | U.S.N.M. | 4 | D5429... | 9 37 30 N.; 118 48 30 E... | 766 | ....... | gn. m........ | Few. |
| 11826 | U.S.N.M. | 2 | D5493 .. | 9 04 00 N.; 125 20 00 E... | 478 | 52.1 | gn. m........ | Rare. |
| 11825 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob.. | Rare. |
| 11819 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 330 | 52.3 | co. s.......... | Rare. |
| 11820 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Rare. |
| 15225 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh.... | Rare. |
| 15172 | U.S.N.M. | 1 | .......... | Tayabas Gulf, P. I........ | ....... | ....... | ............... | |

### CRISTELLARIA ROTULATA (Lamarck).

"Cornu Hammonis seu Nautili" PLANCUS, Conch. Min., 1739, p. 13, pl. 1, fig. 3.

*Lenticulites rotulata* LAMARCK, Ann. Mus., vol. 5, 1804, p. 188, No. 3; vol. 8, 1806, pl. 62, fig. 11.

*Cristellaria rotulata* D'ORBIGNY, H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 547, pl. 69, figs. 13*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 66, pl. 35, fig. 3.

Typical specimens of this species were obtained from numerous stations in the area; in the China Sea off Hongkong; between Burias and Luzon; off Marinduque; west and east coasts of Luzon; between Samar and Leyte; between Negros and Siquijor; north of Tawi Tawi; Sibuko Bay, Borneo; and Gulf of Boni.

These stations range in depth from 20 to 565 fathoms (37 to 1,033 meters), with an average depth of 357 fathoms (653 meters). The average bottom temperature where given was 50.3° F. (10.1° C.).

*Cristellaria rotulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1177 | U.S.N.M. | 4 | D5121 | 13 27 20 N.; 121 17 45 E. | 108 | | dk. gn. m. | Few. |
| 1178 | U.S.N.M. | 7 | D5217 | 13 20 00 N.; 123 14 15 E. | 105 | 63.1 | crs. gy. s. | Frequent. |
| 1179 | U.S.N.M. | 1 | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s. | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5301 | 20 37 00 N.; 115 43 00 E. | 208 | 50.5 | gy. m., s. | Common. |
| [illegible] | U.S.N.M. | 2 | D5377 | 13 26 00 N.; 122 19 00 E. | 400 | 49.6 | sft. gn. m. | Few. |
| [illegible] | U.S.N.M. | 5 | D5438 | 15 54 42 N.; 119 44 42 E. | 297 | 46.2 | gn. m. | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5460 | 13 32 30 N.; 123 58 06 E. | 565 | | gy. m. | Rare. |
| [illegible] | U.S.N.M. | 5 | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | | gn. m. | Frequent. |
| [illegible]<br>[illegible] | U.S.N.M. | 10 | D5470 | 13 37 30 N.; 123 41 09 E. | 560 | | m. | Common. |
| | | | D5478 | 10 46 24 N.; 125 16 30 E. | 57 | | sh. | Rare. |
| | | | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.3 | gn. m., s. | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5569 | 5 33 15 N.; 120 30 15 E. | 303 | 52.3 | co. s. | Few. |
| [illegible] | U.S.N.M. | 1 | D5570 | 5 32 15 N., 120 12 57 E. | 330 | 52.3 | fne. s., glob. | Rare. |
| | | | D5589 | 4 12 10 N.; 118 38 08 E. | 260 | 45.7 | fne. gy. s., gy. m. | Common. |
| | | | D5591 | 4 11 48 N.; 118 38 20 E. | 200 | | | Common. |
| [illegible] | U.S.N.M. | 6 | D5650 | 4 53 45 S.; 121 29 00 E. | 540 | 40.1 | gn. m. | Common. |

### CRISTELLARIA ROTULATA (Lamarck), var. UMBONATA Cushman.

Plate 43, fig. 3.

*Cristellaria rotulata* (LAMARCK), var. *umbonata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 656.

*Description.*—Variety with the umbonal region greatly produced by a large mass of clear shell substance, standing out clearly above the rest of the test.

*Distribution.*—Type specimen (U.S.N.M. No. 9122) from *Albatross* station D5217, in 105 fathoms (193 meters), between Burias and Luzon, bottom temperature 63.1° F. (17.2° C.). Besides at the type station the variety was found at the following *Albatross* stations: D5184, in

565 fathoms (1,033 meters), between Panay and Negros, bottom temperature 49.8° F. (9.8° C.); D5185, in 638 fathoms (1,167 meters), same region and same bottom temperature; D5222, in 195 fathoms (356 meters), between Marinduque and Luzon, bottom temperature 52.8° F. (11.5° C.); D5425, in 495 fathoms (904 meters), Jolo Sea, bottom temperature 49.4° F. (9.7° C.); and D5470, east coast of Luzon, 560 fathoms (1,024 meters).

The variety is much less common than the typical form, but where it occurs seems to be distinct. At only one station was it associated with the typical form.

*Cristellaria rotulata*, var. *umbonata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11795 | U.S.N.M. | 1 | D5184... | 10 18 30 N.; 122 23 30 E... | 565 | 49.8 | gn. m........ | Rare. |
| 11786 | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E... | 638 | 49.8 | gn. m........ | Rare. |
| 13232<br>9122 | U.S.N.M. | 7 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Frequent. |
| 11796 | U.S.N.M. | 3 | D5222.. | 13 38 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m........ | Few. |
| 17775 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| 11785 | U.S.N.M. | 2 | D5470... | 13 37 30 N.; 123 41 09 F... | 560 | ....... | m. ........... | Rare. |

### CRISTELLARIA ORBICULARIS (d'Orbigny).

"Nuclei conico rotundati" SOLDANI, Testaceographia, vol. 2, 1798, *App.*, *p. 138*, pl. 1, fig. 12. *p*, P.

*Robulina orbicularis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 288, pl. 15, figs. 8, 9.

*Cristellaria orbicularis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 549, pl. 69, fig. 17.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 67, pl. 36, figs. 4, 5.

This is one of the commonest species of *Cristellaria* in the region, being found in a large number of stations in the Philippine Archipelago proper; in the China Sea, off Formosa and off Hongkong; southward at several stations off Sibuko Bay, Borneo; in Molucca Passage; and between Gillolo and Kayoa Islands.

The depths range from 43 to 565 fathoms (79 to 1,033 meters), the average depth being 273 fathoms (499 meters). The average bottom temperature for the stations when recorded is 50.7° F. (10.4° C.).

The *Challenger* specimens were mostly from the South Pacific.

Several distinct varieties occur in the region.

*Cristellaria orbicularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15226 | U.S.N.M. | 10+ | D5113 | 13 51 30 N.; 120 50 30 E. | 159 | | dk. gn. m. | Common. |
| 15227 | U.S.N.M. | 10+ | D5114 | 13 36 11 N.; 120 45 26 E. | 340 | | fne. s. | Common. |
| 15228 | U.S.N.M. | 6 | D5198 | 9 40 50 N.; 123 39 45 E. | 220 | 53.9 | gn. m. | Common. |
| 11698 | U.S.N.M. | 2 | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m. | Few. |
| [illegible] | U.S.N.M. | 5 | D5214 | 12 25 18 N.; 123 37 15 E. | 218 | 51.4 | gn. m. | Few. |
| [illegible] | U.S.N.M. | 1 | D5238 | 7 34 45 N.; 126 38 15 E. | 380 | 43.0 | gn. m. | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5259 | 11 57 30 N.; 121 42 15 E. | 312 | 49.3 | gy. m., glob. | Frequent. |
| 15231 | U.S.N.M. | 6 | D5277 | 13 56 55 N.; 120 13 45 E. | 80 | 58.6 | fne. s. | Frequent. |
| | | | D5281 | 13 52 45 N.; 120 25 00 E. | 201 | 50.4 | dk. gy. s. | Frequent. |
| 15232 | U.S.N.M. | 5 | D5282 | 13 53 00 N.; 120 26 45 E. | 248 | 47.4 | dk. gy. s. | Few. |
| 15233 | U.S.N.M. | 7 | D5291 | 13 29 40 N.; 121 00 45 E. | 173 | 51.5 | fne. bk. s. | Frequent. |
| 11700 | U.S.N.M. | 7 | D5301 | 20 37 00 N.; 115 43 00 E. | 208 | 50.5 | gy. m., s. | Frequent. |
| 11702 | U.S.N.M. | 1 | D5313 | 21 30 00 N.; 116 43 00 E. | 150 | 53.6 | s. | Rare. |
| | | | D5318 | 21 32 00 N.; 117 46 00 E. | 340 | | s., br. g. | Few. |
| 15234 | U.S.N.M. | 1 | D5331 | 15 36 45 N.; 119 47 45 E. | 178 | 54.7 | s., sh., m. | Rare. |
| 11701 | U.S.N.M. | 4 | D5338 | 11 33 45 N.; 119 24 45 E. | 43 | | co. s., m. | Few. |
| 15235 | U.S.N.M. | 6 | D5360 | 13 48 00 N.; 121 43 00 E. | 106 | | bk. s. | Frequent. |
| 15236 | U.S.N.M. | 2 | D5371 | 13 49 40 N.; 121 40 15 E. | 83 | | gn. m. | Few. |
| | | | D5410 | 10 28 45 N.; 124 05 30 E. | 385 | | gn. m. | |
| 15237 | U.S.N.M. | 1 | D5424 | 9 37 05 N.; 121 12 37 E. | 340 | 50.4 | co. s. | Rare. |
| 15238 | U.S.N.M. | 1 | D5425 | 9 37 45 N.; 121 11 00 E. | 495 | 49.4 | gy. m., co. s. | Rare. |
| 11703 | U.S.N.M. | 5 | D5438 | 15 54 42 N.; 119 44 42 E. | 297 | 46.2 | gn. m. | Few. |
| 15239 | U.S.N.M. | 1 | D5447 | 13 28 00 N.; 123 46 18 E. | 310 | 45.3 | gn. m. | Rare. |
| 11740 | U.S.N.M. | 10 | D5449 | 13 21 36 N.; 124 00 30 E. | 300 | | | Frequent. |
| 15240 | U.S.N.M. | 2 | D5453 | 13 12 00 N.; 123 49 18 E. | 146 | | | Few. |
| 11736 | U.S.N.M. | 1 | D5460 | 13 32 30 N.; 123 58 06 E. | 565 | | gy. m. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5478 | 10 46 24 N.; 125 16 30 E. | 57 | | sh. | Rare. |
| | | | D5512 | 8 16 02 N.; 123 58 26 E. | 445 | 52.8 | gy. m., fne. s. | Frequent. |
| [illegible] | U.S.N.M. | 4 | D5529 | 9 23 45 N.; 123 39 30 E. | 441 | 53.0 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 10 | D5537 | 9 11 00 N.; 123 23 00 E. | 254 | 53.5 | gn. m. | Common. |
| [illegible] | U.S.N.M. | 1 | D5538 | 9 06 15 N.; 123 23 20 E. | 256 | 53.3 | gn. m., s. | Common. |
| | | | D5567 | 5 48 00 N.; 120 33 45 E. | 268 | 52.0 | fne. s. | Common. |
| [illegible] | U.S.N.M. | 1 | D5569 | 5 33 15 N.; 120 15 30 E. | 303 | 52.3 | co. s. | Rare. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 6<br>1 | D5570 | 5 32 15 N.; 120 12 57 E. | 330 | 52.3 | fne. s., glob. | Common. |
| [illegible] | U.S.N.M. | 2 | D5574 | 5 30 45 N.; 120 07 57 E. | | | | Few. |
| [illegible] | U.S.N.M. | 6 | D5576 | 5 26 56 N.; 120 03 39 E. | 277 | 53.3 | s. | Few. |
| | | | D5580 | 4 12 10 N.; 118 38 08 E. | 260 | 45.7 | fne. gy. s., gy. m. | Common. |
| | | | D5591 | 4 11 48 N.; 118 38 20 E. | 260 | | | Few. |
| | | | D5592 | 4 12 44 N.; 118 27 44 E. | 305 | 43.3 | gn. m. | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5619 | 0 35 00 S.; 127 14 40 E. | 435 | | fne. gy. s., m. | Rare. |
| [illegible] | U.S.N.M. | 7 | D5625 | 0 07 00 N.; 127 28 00 E. | 230 | | gy. m., fne. s. | Common. |

### CRISTELLARIA ORBICULARIS (d'Orbigny), var. SUBCARINATA Cushman.

Plate 44, fig. 1.

*Cristellaria orbicularis* (D'ORBIGNY), var. *subcarinata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 657.

*Description.*—Variety differing from the typical by having instead of a thin broad keel a very narrow one, which is thickened with a rounded periphery, otherwise like the typical.

*Distribution.*—Type specimen (U.S.N.M. No. 9123) from *Albatross* station D5654 in 805 fathoms (1,472 meters), Gulf of Boni, bottom temperature 38.3° F. (3.5° C.). Specimens were also obtained from material dredged at the following stations: D5465, in 500 fathoms (914 meters), and D5467 in 480 fathoms (878 meters), east coast of Luzon, and D5582, in 890 fathoms (1,628 meters), off Darvel Bay, Borneo, bottom temperature 38.3° F. (3.5° C.).

From the data given the variety seems to be developed in the deeper, colder waters of the region.

*Cristellaria orbicularis*, var. *subcarinata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11737 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ....... | gy. m....... | Rare. |
| 11704 | U.S.N.M. | 7 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Frequent. |
| 11705<br>15252 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |
| 13233<br>9123<br>15253 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | .............. | Rare. |

### CRISTELLARIA ORBICULARIS (d'Orbigny), var. SUBUMBONATA Cushman.

Plate 44, fig. 3.

*Cristellaria orbicularis* (D'ORBIGNY), var. *subumbonata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 657.

*Description.*—Variety differing from the typical in its development of ornamental characters, having a cluster of closely set raised knobs over the umbilical region, giving a decidedly umbonate appearance in face view, remainder of the test smooth.

*Distribution.*—Type specimen (U.S.N.M. No. 9124) from *Albatross* station D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.). Specimens were also found in material from *Albatross* stations D5110, China Sea off southern Luzon, 135 fathoms (247 meters), bottom temperature 59.0° F. (15.0° C.); D5152, Sulu Archipelago, 34 fathoms (62 meters); and D5438, in 297 fathoms (543 meters), west coast of Luzon, bottom temperature 46.2° F. (7.8° C.)

*Cristellaria orbicularis*, var. *subumbonata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11707 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Rare. |
| 13229 | U.S.N.M. | 8 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Frequent. |
| 13234<br>9124 | U.S.N.M. | 3 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 11706 | U.S.N.M. | 2 | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | Rare. |

### CRISTELLARIA ORBICULARIS (d'Orbigny), var. PAPILLATA Cushman.

Plate 44, fig. 2.

*Cristellaria orbicularis* (D'ORBIGNY), var. *papillata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 657.

*Description.*—Variety with the keel reduced in width and the earlier portion with an ornamentation consisting of fine papillae rather evenly scattered over the surface, in later growth gradually becoming peripheral and in the last-formed chambers gradually becoming obsolete.

*Distribution.*—Type specimen (U.S.N.M. No. 9125) from *Albatross* station D5152, in 34 fathoms (62 meters), Sulu Archipelago, Tawi Tawi group. Specimens were also obtained from *Albatross* station D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.).

This is a rather beautifully ornamented variety of this species and does not seem to be at all common in the region.

*Cristellaria orbicularis*, var. *papillata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ″ | | °F. | | |
| 9125<br>13351 | U.S.N.M. | 5 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Frequent. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | |

### CRISTELLARIA VORTEX (Fichtel and Moll).

"Nautili globuli" SOLDANI, Testaceographia, vol. 1, pt. 1, 1879, p. 66, pl. 59, fig. *tt*.

*Nautilus vortex* FICHTEL and MOLL, Test. Micr., 1803, p. 33, pl. 2, figs. *d–i*.

*Polystomella vortex* BLAINVILLE, Man. de Malac., 1825, p. 389.

*Robulina vortex* D'ORBIGNY, Ann. Sci. Nat., vol. 7., 1826, p. 288, No. 4.

*Cristellaria vortex* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 240, pl. 10, fig. 82.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 548, pl. 69, figs. 14–16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 68, pl. 32, fig. 3.

Very fine specimens of this species have occurred in the *Albatross* material of the following localities: Off Romblon; between Burias and Luzon; Ragay Gulf and east coast of Luzon; between Samar and Leyte; north of Tawi Tawi; Buton Strait; and Gulf of Boni. These stations range in depth from 24 to 976 fathoms (44 to 1,785 meters) with the average 308 fathoms (564 meters); the bottom temperatures with an average of 57.8° F.(14.4° C).

Brady's *Challenger* material with one exception was from the Southern Pacific. The North Pacific material which I had, was from the Hawaiian Islands and Guam, and apparently this species is most at home in fairly warm waters of the Pacific.

*Cristellaria vortex*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11763 | U.S.N.M. | 8 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Frequent. |
| 11764<br>11765 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Common. |
| 11766 | U.S.N.M. | 4 | D5217... | 13 20 00 N.; 123 14 15 E... | 106 | 63.1 | crs. gy. s.... | Few. |
| 11769 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E... | 128 | ....... | m........... | Few. |
| 11767 | U.S.N.M. | 1 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m........... | Rare. |
| 12215 | U.S.N.M. | 4 | D5495... | 9 06 30 N., 125 00 20 E... | 976 | 52.3 | gy. m....... | Few. |
| | | | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob. | Rare. |
| 11768 | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s. brk., sh... | Few. |
| 12216 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |

### CRISTELLARIA CONVERGENS Bornemann.

Plate 44, figs. 4*a*, *b*.

1155

*Cristellaria convergens* BORNEMANN, Zeitschr. deutsch. Geol. Ges., vol. 7, 1885, p. 327, pl. 13, figs. 16, 17.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 546, pl. 69, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 68, pl. 34, fig. 3.

This species has occurred at five stations within the area as follows: *Albatross* stations D5178, in 78 fathoms (143 meters), off Romblon; D5215, in 604 fathoms (1,105 meters), east of Masbate Island, bottom temperature 50.5° F. (10.2 C.); D5220, in 50 fathoms (91 meters), between Marinduque and Luzon; D5469, in 500 fathoms (914 meters), east coast of Mindanao; and D5523, off northern Mindanao. It was also found off Jolo Jolo.

At none of these stations were there but a few specimens of the species.

*Cristellaria convergens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11876 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 11871 | U.S.N.M. | 1 | D5215... | 12 31 30 N.; 123 35 24 E.. | 604 | 50.5 | gn. m....... | Rare. |
| 11874 | U.S.N.M. | 8 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Few. |
| 11873 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |
| 11875 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ...... | ....... | ............... | Rare. |
| 15295 | U.S.N.M. | 3 | .......... | Jolo Jolo, P. I............. | ...... | ....... | ............... | Few. |

### CRISTELLARIA GIBBA d'Orbigny.

Plate 45, fig. 1.

*Cristellaria gibba* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères" p. 63, pl. 7, figs. 20, 21.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 546, pl. 69, figs. 8, 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 69, pl. 35, fig. 1.

Only a very few records of this species in the area were noted. It occurred at *Albatross* stations D5121, east coast of Mindoro, 108 fathoms (198 meters); D5338, Mindoro Strait, 310 fathoms (567 meters), bottom temperature 73.8° F. (23.2° C.); D5333, in 43 fathoms (78 meters), and D5348, in 375 fathoms (686 meters), both in Palawan Passage, the latter station with a bottom temperature of 56.4° F. (13.5 C.); D5481, in 61 fathoms (112 meters), between Samar and Leyte, vicinity of Suriago Strait; and D5650 in 540 fathoms (988 meters), in the Gulf of Boni.

*Cristellaria gibba*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 1694 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| [illegible]13 | U.S.N.M. | 4 | D5333... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co., s., m ... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5338... | 12 26 30 N.; 120 37 45 E.. | 310 | 73.8 | Co., s., m ... | Few. |
| [illegible]14 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 33 15 E.. | 375 | 56.4 | Co., s........ | Few. |
| [illegible]07 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ....... | s., sh., g..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |

### CRISTELLARIA VARIABILIS Reuss.

*Cristellaria variabilis* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 369, pl. 46, figs. 15, 16.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 541, pl. 68, figs. 11-16.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 70, pl. 36, figs. 1-3.

Specimens of this species have been noted in material from the following *Albatross* stations in the area: D5201, Sogod Bay, southern Leyte, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); D5242, in 191 fathoms (350 meters), off Pujada Bay, bottom temperature 64.1° F. (17.8° C.); D5300, China Sea, off southern Luzon, 265 fathoms (485 meters); D5301, in 208 fathoms (381 meters), China Sea off Hongkong, bottom temperature 50.5° F. (10.2° C.); D5420, in 127 fathoms (233 meters), between Cebu and Bohol, bottom temperature 59° F. (15° C.); D5445, east coast of Luzon, 383 fathoms (699 meters), bottom temperature 44.3° F. (6.8° C.); D5601 in 765 fathoms (1,399 meters), also in the Gulf of Tomini, Celebes; and D5613 in 752 fathoms (1,375 meters) also in the Gulf of Tomini.

This is a rather distinctive species, easily distinguished by its few chambers in each volution and the peculiar fimbriate appearance of the area about the aperture, especially in well-developed specimens.

*Cristellaria variabilis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11761 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| | | | D5242... | 6.51 53 N.; 126 14 10 E.. | 191 | 64.1 | slt. gy. m.... | Rare. |
| 11759 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 11760 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| 11756 | U.S.N.M. | 1 | D5420... | 9 49 35 N.; 123 45 00 E.. | 127 | 59.0 | ............ | Rare. |
| 11766 | U.S.N.M. | 2 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Rare. |
| 11758 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s., glob., ptr. | Rare. |
| 11757 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Rare. |

### CRISTELLARIA TRICARINELLA Reuss.

Plate 50, figs. 3*a*, *b*.

*Cristellaria tricarinella* Reuss, Sitz. Akad. Wiss. Wien, vol. 46, 1862, p. 68, pl. 7, fig. 9; pl. 12, figs. 2-5.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 540, pl. 68, figs. 3, 4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 72, pl. 34, figs. 1, 2.

Brady records this species from three *Challenger* stations in the western Pacific of which one is off the Philippines in 95 fathoms (174 meters). It has occurred at the following stations in the *Albatross* Philippine dredgings: D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte, bottom temperature, 52.8° F. (11.5° C.); D5211, in 155 fathoms (283 meters), east of Masbate Island, bottom temperature, 56.6° F. (13.7° C.); D5268, in 170 fathoms (311 meters), off Batangas Bay; D5318, in 340 fathoms (622 meters), China Sea off Formosa; D5592, in 305 fathoms (558 meters), off Sibuko Bay, Borneo, bottom temperature, 43.3° F. (6.1° C.).

This does not in all respects, especially those of the early development, agree very closely with the species of Reuss, and its limited area of distribution in the Indo-Pacific seems to indicate that it may be a distinct species.

The records outside the Philippine region include the *Challenger* records; off Raine Island, Torres Strait, 155 fathoms (283 meters), and off the west coast of New Zealand, 150 fathoms (270 meters) (Brady); off Great Barrier Island, New Zealand, 110 fathoms (200 meters); north of Enderby Island, New Zealand, 85 fathoms (153 meters); 40 miles south of Cape Wiles, South Australia (Chapman); from off Mauritius; off the west coast of Australia (Egger); and from off Ceylon (Dakin).

*Cristellaria tricarinella—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11750 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Rare. |
| 11753 | U.S.N.M. | 2 | D5211... | 11 51 35 N.; 124 14 00 E... | 155 | 56.6 | gn.m.,s..... | Rare. |
| 11750 | U.S.N.M. | 1 | D5268... | 18 42 00 N.; 120 57 15 E... | 170 | ....... | p., s.,sh..... | Rare. |
| 11752 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s.,br. Co.... | Rare. |
| 11749 | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn.m........ | Rare. |

### CRISTELLARIA TRICARINELLA Reuss, var. SPINIPES Cushman.

*Cristellaria tricarinella* Reuss, var. *spinipes* Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 72, pl. 33, fig. 2.

This variety was represented at three of the *Albatross* stations as follows: D5178, in 78 fathoms (143 meters), off Romblon; D5301, in 208 fathoms (381 meters), China Sea off Hongkong, bottom temperature 50.5° F. (10.2° C.); and D5590, in 310 fathoms (567 meters), Sibuko Bay, Borneo, bottom temperature 44.3° F. (6.8° C.).

The variety was described from *Albatross* station D4900 off southern Japan, a station with a bottom temperature of 52.9° F. (11.6° C.), where numerous species of the Philippine region seem to reach their northern limit.

*Cristellaria tricarinella*, var. *spinipes*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11747 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne.s........ | Rare. |
| 11748 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy.m.,s..... | Rare. |
| 11746 | U.S.N.M. | 3 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn.m.,s..... | |

### CRISTELLARIA CALCAR (Linnaeus).

Plate 45, figs. 2*a*, *b*.

"Nautilus minimus non umbilicatus" GAULTIERI, Index Test., 1742, pl. 19, fig. C.

"Nautili (Lenticulæ radiatæ)" SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 54, pl. 33, figs. *aa*, *bb*.

*Nautilus calcar* LINNAEUS, Syst. Nat., ed. 12, 1767, p. 1162, No. 272; (Gmelin's) ed. 13, 1788, p. 3370, No. 2.

*Robulina calcar* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 99, pl. 4, figs. 18–20.

*Cristellaria calcar* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 2, vol. 19, 1857, p. 289, pl. 10, figs. 10–12.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 551, pl. 70, figs. 9–12 (not 13–15).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 72, pl. 32, fig. 4.

The great mass of material of *Cristellaria* which has been obtained from the Philippine material has made possible the demarcation of various species and the segregation of new forms with a much surer basis than would be the case with a few specimens. The abundance of specimens has resulted almost invariably in the clearness of lines of separation rather than in the obliteration of such lines. This has been the case here and the species *C. calcar* has been restricted to the test, comparatively small in size, with a few chambers in each whorl and with long acicular spines, one to each chamber, radially placed on the periphery, the peripheral carina being very narrow.

Such a test as described above occurred in more or less numbers in material from a number of stations in the area. Most of these stations are in the Philippine Archipelago proper, but a few are outside in the China Sea off Formosa, and off Sibuko Bay, Borneo. In the restricted Philippine area it has occurred off the east coast of Mindoro; Sogod Bay, southern Leyte; east of Masbate; between Marinduque and Luzon; between Siquijor and Bohol; and especially at various stations about Marinduque.

These stations range in depth from 50 to 554 fathoms (91 to 1,012 meters), the average depth being 239 fathoms (437 meters). The average temperature of the stations where this was recorded is 51.5° F. (10.8° C.).

Brady records this species off the Philippines in 95 fathoms (174 meters).

*Cristellaria calcar—Material examined.*

| Cat. No. | Coll. of— | No. of speci- mens. | Station. | Locality. | Depth in fath- oms. | Bot- tom tem- pera- ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 15217 | U.S.N.M. | 7 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Frequent. |
| 11796 | U.S.N.M. | 7 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Frequent. |
| 15218 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m........ | Rare. |
| 11797 | U.S.N.M. | 5 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Common. |
| 11801 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |
| | | | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh........ | |
| 11802 | U.S.N.M. | 5 | D5369... | 13 48 00 N.; 121 43 00 F... | 106 | ....... | bk. s......... | Common. |
| 15219 | U.S.N.M. | 1 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m........ | Rare. |
| 11800 | U.S.N.M. | 1 | D5371... | 13 49 40 N.; 121 40 15 E... | 83 | ....... | gn. m........ | Rare. |
| 15308 | U.S.N.M. | 7 | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m............ | Common. |
| 11803 | U.S.N.M. | 2 | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ....... | gy. m........ | Few. |
| 11220 | U.S.N.M. | 3 | D5529 .. | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob. | Few. |
| 11799 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Few. |

## CRISTELLARIA CALCARATA Cushman.

Plate 45, fig. 3.

*Cristellaria calcarata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 657.

*Description.*—Test biconvex, but much compressed, closely coiled, about seven or eight chambers in the last-formed coil; sutures curved, and marked by raised ridges running to the umbonal region, where they unite in a central boss of clear shell material, which is typically excavated in the center, forming a ring of material; periphery with a narrow keel from which are rowel-like spines, the two sides often unequal in their angles; apertural face flattened or even concave, aperature radiate.

Diameter about 2 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9126) from *Albatross* station D5370, in 159 fathoms (291 meters), off Marinduque Island, bottom temperature 54.3° F. (12.3° C.). Besides this station it was found at various stations in the China Sea off southern Luzon; Sogod Bay, southern Leyte; off southeastern Mindoro; off northern Mindanao; and China Sea off Formosa.

The range of depths of these stations is from 28 to 554 fathoms (51 to 1,012 meters), the average depth 262 fathoms (480 meters). The average bottom temperature where given is 54.1° F. (12.2° C.).

This species is at once distinguished from *C. calcar* by its ornamentation, from *C. submamilligera* by its spines, and from *C. echinata* by its type of spines and its lack of bosses or papillae. It is also more compressed than most of the species of *Cristellaria* with peripheral spines. It seems in the mass of material examined to be a very distinctive species.

*Cristellaria calcarata—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible]<br>[illegible] | U.S.N.M. | 5 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Frequent. |
| [illegible] | U.S.N.M. | 8 | D5113... | 12 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gy. m... | Frequent. |
| [illegible]<br>[illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gn. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5257... | 7 22 12 N.; 124 12 15 E... | 28 | ....... | m........... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s. sh........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | .......... | Near Cebu................ | ...... | ...... | ............... | Rare. |

### CRISTELLARIA ECHINATA (d'Orbigny).

Plate 45, figs. 4*a*, *b*; plate 46, figs. 1*a*, *b*.

"Nautili Echinati" etc., SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 65, pl. 59, figs. *qq*, *rr*.

*Nautilus calcar*, var. *e*, FICHTEL and MOLL, Test. Micr., 1803, p. 74, pl. 12, figs. *a*, *b*, *c*.

*Robulina echinata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 100, pl. 4, figs. 21, 22.

*Cristellaria* (*Robulina*) *echinata*, CARPENTER, PARKER, and JONES, Introd. Foram., 1862, pl. 12, fig. 3.

*Cristellaria echinata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 554, pl. 71, figs. 1–3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 73, pl. 34, fig. 5.

This beautiful species, allied with *C. calcar*, has been found to be a common one, both in the China Sea and in the more protected waters of the Archipelago. It has not been noted in the deeper waters of the southern area in which the *Albatross* dredged—Flores Sea, Gulf of Boni, etc. It apparently is most at home in warm waters of moderate depth. Brady records it from the Philippines in 95 fathoms (174 meters), one of the two stations from which the *Challenger* obtained it. Some of the localities at which the *Albatross* obtained the species are off southern and western Luzon; east and southeastern coasts of Mindoro; off western Bohol; Sogod Bay, southern Leyte; off northwestern Panay; off Marinduque; between Cebu and Bohol; Jolo Sea; eastern Palawan; between Samar and Leyte; north of Tawi Tawi, etc. At numerous stations it is recorded as common or frequent.

The stations except one range in depth from 108 to 766 fathom (198 meters to 1,400 meters), average depth 320 fathoms (58 meters). The bottom temperatures average 52.4° F. (11.3° C.).

*Cristellaria echinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15717 | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E... | 10 | ....... | Co.......... | Rare. |
| 15201 | U.S.N.M. | 3 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk. gy. m... | Few. |
| 15202 | U.S.N.M. | 4 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Frequent. |
| 15203 | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E... | 220 | 53.9 | gn. m....... | Rare. |
| 11998 | U.S.N.M. | 7 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Frequent. |
| 11996<br>11937 | U.S.N.M. | 7 | D5250... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Common. |
| 15204 | U.S.N.M. | 9 | D5261... | 12 30 55 N.; 121 34 54 E... | 145 | ....... | s., m........ | Frequent. |
| 15205 | U.S.N.M. | 10+ | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh., co. s. | Abundant. |
| 11299 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Rare. |
| 15206 | U.S.N.M. | 3 | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s., sh., m.... | Few. |
| 11997<br>12001<br>15207 | U.S.N.M. | 8 | D5374... | 13 46 45 N.; 121 35 08 E... | 190 | ....... | gy. m....... | Rare. |
| 15208 | U.S.N.M. | 3 | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m....... | Few. |
| 12003 | U.S.N.M. | 1 | D5423... | 9 38 30 N.; 121 11 00 E... | 508 | 49.8 | gy. m., co. s. | Rare. |
| 12002 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Rare. |
| 15209 | U.S.N.M. | 2 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co s.. | Few. |
| 15210 | U.S.N.M. | 4 | D5429... | 9 37 30 N.; 118 48 30 E... | 766 | ....... | gn. m....... | Few. |
| 12000 | U.S.N.M. | 7 | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | Common. |
| 15211 | U.S.N.M. | 1 | D5493... | 9 04 00 N.; 125 20 00 E... | 478 | 52.1 | gn. m....... | Rare. |
| 15212 | U.S.N.M. | 8 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s. | Frequent. |
| 15213 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............ | Rare. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob. | Frequent. |
| 15214 | U.S.N.M. | ...... | D5560... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| 15168 | U.S.N.M. | 1 | .......... | Tayabas Gulf, P. I........ | ....... | ....... | ............ | Rare. |

### CRISTELLARIA PAPILLOSA (Fichtel and Moll).

*Nautilus papillosus* Fichtel and Moll, Test. Micr., 1803, p. 82, pl. 14, figs. *a-c*.

*Cristellaria papillosa* Parker and Jones, Ann. Mag. Nat. Hist., ser. 3, vol. 5, 1860, p. 113, No. 17.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol 9,1884, p. 553, pl. 70, fig. 16.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3,1913 p. 74, pl. 37. fig. 2.

Brady had this species from but two *Challenger* stations—on in the West Indies, the other in the Indo-Pacific.

Very fine specimens have occurred in material from the followin four *Alabatross* stations in this area: D5301, in 208 fathoms (38 meters), China Sea, vicinity of Hongkong, bottom temperatu 50.5° F. (10.2° C.); D5424, in 340 fathoms (622 meters), Jolo Sea bottom temperature 50.4° F. (10.2° C.); D5589, in 260 fathom (476 meters) off Sibuko Bay, bottom temperature 45.7° F. (7.6° C. and D5592, in 305 fathoms (558 meters), off Sibuko Bay, Borne bottom temperature 43.3° F. (6.1° C.).

This is a beautifully ornamented species with the rows of beadin gradually decreasing in size toward the periphery and in the late added portions.

*Cristellaria papillosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Rare. |
| [illegible] | U.S.N.M. | 4 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m....... | Few. |

### CRISTELLARIA ACULEATA d'Orbigny.

*Cristellaria aculeata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 292, No. 14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9. 1884, p. 555, pl. 71, figs. 4, 5.

There are two specimens which are very close to the figures of this species as given by Brady. They occur as single specimens at two stations in water of medium depth. Brady's material dredged by the *Challenger* was from the West Indian region, but these specimens seem to be identical. They are not *C. gemmata*, which is much more common in the same region and which seems to be limited to the Indo-Pacific.

*Cristellaria aculeata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E . | 248 | 47.4 | dk. gy. s...... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |

### CRISTELLARIA SUBMAMILLIGERA Cushman.

*Cristellaria mamilligera* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 553, pl. 70, figs. 17, 18 (not *C. mamilligera* Karrer).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 74, pl. 34, fig. 6*a* (not 6*b* which should read 5*b*).

*Cristellaria submamilligera* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 657.

*Description.*—Test biconvex, close-coiled, periphery with a thin keel; sutures curved, limbate externally, ornamented by a raised ridge which ends near the umbilical region in a protuberant knob, often a distinct raised boss over the center of the umbilical region; keel entire and not denticulate in well-preserved specimens; wall between the raised ridges, smooth; aperture radiate.

Diameter up to 3 mm., usually less.

*Distribution.*—Type specimen (U.S.N.M. No. 9127) from *Albatross* station D5388, in 226 fathoms (414 meters), between Burias and Luzon, bottom temperature 51.4° F. (10.8° C.), where the species was abundant. The species is a very common one in the Philippine Archipelago, being found also in the China Sea, but no recorded in the areas to the south. It seems to be characteristic o warm, not too deep water. Some of the general localities are a follows: Off southern Luzon; east coast of Mindoro; off western Bohol; Sogod Bay, southern Leyte; east of Masbate; betwee Marinduque and Luzon; off northwestern Panay; Ragay Gulf, Luzon between Samar and Masbate; between Cebu and Bohol; Jolo Sea between Negros and Siquijor; and north of Tawi Tawi.

The depth of these stations ranges from 30 to 554 fathoms (55 t 1,012 meters), the average being 215 fathoms (393 meters), and th average bottom temperature 52.4° F. (11.3° C.).

The species differs from *C. mamilligera* Karrer in the keel, which is entire and not regularly denticulate; the ornamentation, which consists of raised ridges with bosses and not of a series of knobs.

Brady had material from the Philippines in 95 fathoms (17 meters).

*Cristellaria submamilligera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15178 | U.S.N.M. | 4 | D5097... | 14 19 15 N.; 120 34 15 E... | 30 | ....... | gy. m., s., sh. | Frequent. |
| 15179 | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Frequent. |
| 15180 | U.S.N.M. | 4 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m.... | Few. |
| 15181 | U.S.N.M. | 2 | D5198... | 9 40 50 N.; 123 39 45 E... | 220 | 53.9 | gn. m....... | Few. |
| 11724<br>11725 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m .... | Rare. |
| 15182 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m....... | Rare. |
| 15183 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m....... | Rare. |
| 11790<br>11726<br>15184 | U.S.N.M. | 5<br>9 | D5250... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Frequent. |
| 11585 | U.S.N.M. | 3 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh., co. s. | Few. |
| 15186 | U.S.N.M. | 5 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne. s., m., sh | Frequent. |
| 11793 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |
| 15187 | U.S.N.M. | 7 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s.... | Frequent. |
| 11789 | U.S.N.M. | 10 | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s.... | Frequent. |
| 11791 | U.S.N.M. | 4 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Frequent. |
| 15188 | U.S.N.M. | 3 | D5369... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | bk. s........ | Few. |
| 11792 | U.S.N.M. | 2 | D5371... | 13 49 40 N.; 121 40 15 E... | 83 | ....... | gn. m....... | Few. |
| 15189 | U.S.N.M. | 6 | D5374... | 13 46 45 N.; 121 35 08 E... | 190 | ....... | gy. m....... | Frequent. |
| 15190 | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s......... | Rare. |
| 15191 | U.S.N.M. | 9 | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m.... | Abundant |
| 15192 | U.S.N.M. | 1 | D5394... | 12 00 30 N.; 124 05 36 E... | 153 | ....... | gn. m....... | Rare. |
| 15193 | U.S.N.M. | 1 | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m....... | Rare. |
| 15194 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 11 00 E... | 495 | 49.4 | gy. m., co. s. | Rare. |
| | | | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s | Few. |
| 15195 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ........ | ....... | .............. | Rare. |
| 15196 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Rare. |
| 15197 | U.S.N.M. | 2 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| 15198 | U.S.N.M. | 1 | D5569... | 5 13 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| 15199 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E .. | 540 | 40.1 | gn. m....... | Rare. |

### CRISTELLARIA EXPANSA Cushman.

Plate 46, figs. 2*a*, *b*.

*Cristellaria expansa* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 658.

*Description.*—Test biconvex, with a very wide, prominent, ver thin keel; chambers with a large alar projection on the umbilica end extending beyond the umbilicus and onto the previous whorl; sutures with raised ribs ending in a knob near the umbilicus, remainder of surface smooth; aperture radiate, apertural face concave.

Diameter up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9128) from *Albatross* station D5467, in 480 fathoms (878 meters), east coast of Luzon. The species also occurred at numerous stations, mostly in the China Sea and in the Philippine Archipelago. The depth of these stations ranges from 88 to 554 fathoms (161 to 1,012 meters), the average being 260 fathoms (476 meters). The average bottom temperature is 52.6° F. (11.4° C.).

This species differs from *C. submamilligera* mainly in its great development of the alar projection on the inner border of the chamber.

*Cristellaria expansa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 4 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Few. |
| [illegible] | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5123... | 13 12 45 N.; 121 38 45 E... | 283 | ....... | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 9 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Common. |
| [illegible] | U.S.N.M. | 10+ | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh., co. s. | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5369... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | bk. s........ | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s........ | Few. |
| [illegible] | U.S.N.M. | 4 | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m........... | Few. |
| [illegible] | U.S.N.M. | 1 | D5410... | 10 28 45 N.; 124 05 30 E... | 385 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Rare. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............. | |
| [illegible] | U.S.N.M. | 2 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 12 57 E... | 303 | 52.3 | co. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E... | ....... | ....... | ............. | Rare. |

### CRISTELLARIA EXPANSA, var. PLANULATA Cushman.

Plate 46, figs. 3*a*, *b*.

*Cristellaria expansa*, var. *planulata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 658.

*Description.*—Variety differing from the typical mainly in the lack of ornamentation characteristic of the type, and if at all ornamented consisting of indistinct costae in the axis of growth; alar projections more distinct than in the type, due to the lack of ornamentation to hide the sutures, usually more compressed than the type form.

*Distribution.*—Type specimen (U.S.N.M. No. 9129) from *Albatross* station D5220, in 50 fathoms (91 meters), between Marinduque and Luzon.

*Cristellaria expansa*, var. *planulata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11617<br>9129 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Rare. |
| 15301 | U.S.N.M. | 3 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob.. | Few. |

### CRISTELLARIA DENTICULIFERA Cushman.

*Cristellaria cultrata* MONTFORT, dentate variety H. B. BRADY, Rep. Voy, *Challeng* Zoology, vol. 9, 1884, p. 550, pl. 70, figs. 7, 8.

*Cristellaria denticulifera* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 7 pl. 37, fig. 1.

*Description.*—Test biconvex, sutures curved; periphery marked b a keel which is denticulate, especially between the terminations o the sutures; the sutures somewhat limbate externally and wit raised lines, terminating in a raised mass of clear shell material a the umbo; surface ornamented by a series of broken costae, runnin longitudinally and somewhat obliquely; especially well-developed o the earlier chambers, becoming obsolete in later growth.

Diameter up to 2 mm.

*Distribution.*—Typical specimens were obtained from *Albatro* stations: D5110, in 135 fathoms (247 meters), China Sea off souther Luzon, bottom temperature 59° F. (15° C.); D5132, in 26 fathon (48 meters), Sulu Sea off western Mindanao; D5214, in 218 fathon (399 meters), east of Masbate Island, bottom temperature 51.4° I (10.8° C.); D 5313, in 150 fathoms (270 meters), China Sea off Hon kong, bottom temperature 53.6° F. (12° C.); D5255, in 100 fathon (183 meters), Gulf of Davao, D5565, in 243 fathoms (445 meters between Jolo and Tawi Tawi, bottom temperature 52.3° F. (11.2° C. and D5637, in 700 fathoms (1,280 meters), off Bouro Island.

Brady records *C. cultrata* in 95 fathoms off the Philippines, and i would be interesting to know whether this was the denticulate for he figures.

The species is very constant in its characters, and the figures give by Brady in the *Challenger* Report are good figures of it.

*Cristellaria denticulifera*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12029 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m.... | Rare. |
| 12028 | U.S.N.M. | 1 | D5132... | Island off Panabutan Point N.; 15° W., .30 mile. | 26 | ....... | gn. m., s..... | Rare. |
| 13326 | U.S.N.M. | 2 | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Rare. |
| 13324 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s........... | Rare. |
| 13325 | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft. m....... | Rare. |
| 15254 | U.S.N.M. | 1 | D5565... | 5 51 42 N.; 120 30 30 E.. | 243 | 52.3 | s. ptr. sh.... | Rare. |
| 12017 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |

### CRISTELLARIA GEMMATA H. B. Brady.

*Cristellaria gemmata* H. B. BRADY, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 64; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 554, pl. 71, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 75, pl. 34, fig. 7.

Brady describes this species from three Indo-Pacific stations of the *Challenger*, one of which was in the Philippines at a depth of 95 fathoms (174 meters).

Apparently this is a rather limited species, as it does not seem to occur or to be noted outside this region. I have had excellent material from several stations in the Philippines; China Sea off southern Luzon; between Marinduque and Luzon; off southeastern Mindoro; off Marinduque, it being especially well distributed. The 10 stations range in depth from 106 to 340 fathoms (194 to 622 meters), with the average 198 fathoms (363 meters). The average bottom temperature where given was 52.5° F. (11.3° C.).

*Cristellaria gemmata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 9 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Frequent. |
| [illegible] | U.S.N.M. | 4 | D5113... | 13 51 30 N.; 120 50 20 E.. | 159 | ....... | dk. gn. m... | Few. |
| [illegible] | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 7 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m......... | Frequent. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | |
| [illegible] | U.S.N.M. | 10+ | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co..... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ....... | bk. s......... | Few. |
| [illegible] | U.S.N.M. | 3 | D5370... | 13 44 15 N.; 121 42 30 E.. | 159 | 54.3 | sft. m........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m........ | Few. |

### CRISTELLARIA COSTATA (Fichtel and Moll).

Plate 46, fig. 4; plate 47, fig. 1.

*Nautilus costatus* FICHTEL and MOLL, Test. Micr., 1803, p. 47, pl. 4, figs. *g–i*.
*Spincterules costatus* MONTFORT, Conch. Syst., 1808, p. 222, 56° genr.
*Lenticulina costata* DEFRANCE, Dict. Sci. Nat., vol. 32, 1824, p. 182.
*Robulina costata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 289, No. 13 [?].
*Cristellaria costata* PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 5, 1860, p. 113, No. 19.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 555, pl. 71, fig. 8 (not fig. 9).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 75, pl. 34, fig. 4.

*Distribution.*—This species with its attendant variations is one of the most striking constituents of the foraminiferal fauna of this area. With large suites of specimens it has been found possible to split the various forms into a typical form, with three varieties according to the trend which the variation develops. These varieties, while they seem almost like separate species, can be connected with one another and are really different modifications of the same type of ornamented test.

The typical form, consisting of a compressed test, close-coiled, wit a few chambers, a rather acute peripheral border, and an ornament tion consisting of raised costal lines on the limbate sutures, with a independent set of costae between and running more nearly in t axis of growth. In the typical form these two sets of costae a more or less evenly balanced, as in the figure given by Brady (pl. 7 fig. 9) and as shown here.

The typical form of the species as here selected occurred at a nu ber of stations in the area within the Archipelago proper; off Ro blon; Sogod Bay, southern Leyte; at several stations off Marinduq Island; off northwestern Panay; and China Sea, off southern Luzo

The stations range in depth from 50 to 554 fathoms (91 to 1,01 meters), with the average 215 fathoms (393 meters). The only tw stations at which bottom temperatures were taken are 49.3° F. an 52.8° F. (9.6° C. and 11.5° C.).

*Cristellaria costata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11833 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| 11834 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 126 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 11835<br>15302 | U.S.N.M. | 3 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Frequent |
| 11838 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 15666 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s..... | Few. |
| 11837<br>11836 | U.S.N.M. | 6 | D5369... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | dk. s........ | Frequent |
| 11839 | U.S.N.M. | 2 | D5374... | 13 46 45 N.; 121 35 08 E... | 190 | ....... | gy. m....... | Few. |

### CRISTELLARIA COSTATA (Fichtel and Moll), var. MULTICOSTA Cushman.

Plate 47, figs. 2, 3.

*Cristellaria costata* (Fichtel and Moll), var. *multicosta* Cushman, Proc. U. Nat. Mus., vol. 51, 1917, p. 658.

*Description.*—Variety very much compressed, complanate, wi the costae along the limbate sutures obsolete, the sutures slight depressed; the ornamentation of each chamber consisting of a lar number of fine raised costae spreading fan-like from the aperture a center backward and covering the entire surface of the chamb aperture radiate, protruded.

Diameter up to 4 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9130) from *Albatro* station D5538, in 256 fathoms (468 meters), between Negros a Siquijor, bottom temperature 53.3° F. (11.8° C.). Besides at t type station well-marked specimens of this variety have occurred *Albatross* station D5178, in 78 fathoms (143 meters), off Romblo D5259, in 312 fathoms (571 meters), off northwestern Panay, botto temperature 49.3° F. (9.6° C.); D5278, in 102 fathoms (187 meters), China Sea off southern Luzon, bottom temperature 59.6° F. (15.3° C.); D5537, in 254 fathoms (465 meters), between Negros and Siquijor, bottom temperature 53.5° F. (11.8° C.); and D5579, in 175 fathoms (320 meters), off Darvel Bay, Borneo, bottom temperature 55.3° F. (12.9° C.).

This variety is one of the most beautifully sculptured of all the genus. It is an extreme modification of the costae of the chambers which are developed at the expense of those of the sutures.

*Cristellaria costata*, var. *multicosta*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| [illegible] | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne. s., m., sh | Rare. |
| [illegible] | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co ... | Rare. |

### CRISTELLARIA COSTATA (Fichtel and Moll), var. SUBDECORATA Cushman.

Plate 47, figs. 4, 5.

*Cristellaria costata* (FICHTEL and MOLL), var. *subdecorata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 659.

*Description.*—Variety with the costae of the sutures the predominant factor in the ornamentation, the areas between with fine costae or striae, anastomosing; the costae of the sutures large and well-marked, sharply raised above the surface of the test, the umbilical region covered with a thick cluster of irregular bosses; periphery with traces of a keel between the sutures.

Diameter up to 4 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9131) from *Albatross* station D5454, in 153 fathoms (279 meters), east coast of Luzon. The variety was common at this station and occurred more or less frequently at the following *Albatross* stations: D5115, in 340 fathoms (622 meters), off Balayan Bay; D5121, in 108 fathoms (198 meters), east coast of Mindoro; D5191, Tanon Strait, in 258 fathoms (622 meters), bottom temperature 62.8° F. (17.1° C.); D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); D5261, off southeastern Mindoro, in 145 fathoms (265 meters); D5388, in 226 fathoms (414 meters), between Burias and Luzon, bottom temperature 51.4° F. (10.8° C.); D5291, in 173 fathoms (316 meters), China Sea off southern Luzon, bottom temperature 51.5° F. (10.8° C.); D5412, in 162 fathoms (297 meters), between Cebu and Bohol, bottom temperature 54.8° F. (12.6° C.); and D5523, northern Mindanao.

This is the most beautifully ornamented variety of the species, and is full of detailed sculpture as shown in the figure. It has occurred in very large numbers at two of the stations.

*Cristellaria costata*, var. *subdecorata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11842 | U.S.N.M. | 1 | D5115... | 13 37 11 N.; 120 43 40 E... | 340 | ........ | ............... | Rare. |
| 11850 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ........ | dk. gn. m... | Rare. |
| 11845 | U.S.N.M. | 2 | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn. m........ | Rare. |
| 11847 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 11841 | U.S.N.M. | 3 | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ........ | s., m........ | Few. |
| 11846 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Rare. |
| 11843 | U.S.N.M. | 1 | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m... | Rare. |
| 15304 | U.S.N.M. | 10+ | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s.... | Common. |
| 11849 | U.S.N.M. | 1 | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m........ | Rare. |
| 11844<br>9131 | U.S.N.M. | 10+ | D5454... | 13 12 00 N.; 123 50 30 E... | 153 | ........ | ............... | Common. |
| 11848 | U.S.N.M. | 4 | D5523... | 8 48 44 N.; 123 27 35 E... | ........ | ........ | ............... | Few. |

### CRISTELLARIA COSTATA (Fichtel and Moll), var. SUBLAEVIS Cushman.

Plate 49, fig. 1.

*Cristellaria costata* (FICHTEL and MOLL), var. *sublaevis* CUSHMAN, Proc. U. S. Nat Mus., vol. 51, 1917, p. 659.

*Description.*—Variety differing from the typical in having th ornamentation of the test so developed that the limbate sutures an their resulting costae are developed at the complete expense of th other costae of the chambers or nearly so, the costae of the suture being very high and ending on the inner border of each in a larg raised knob; peripheral margin of the test keeled, somewhat interrupted at the sutures; wall of the chambers smooth or marked with obsolescent striae in some cases.

Diameter 3 to 4 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9132) from *Albatros* station D5374, in 190 fathoms (348 meters), off Marinduqu Island. Specimens were also obtained from D5192, off norther Cebu Island, 32 fathoms (59 meters); D5212, in 108 fathoms (19 meters), east of Masbate Island, bottom temperature 59.9° F. (15.5 C.); D5523, off northern Mindanao; and D5586, Sibuko Bay, Borneo 347 fathoms (635 meters), bottom temperature 44.0° F. (6.6° C.)

In this variety the costae of the chambers so highly developed i var. *multicosta* are almost entirely lacking and the development o the other set of ornamental costae is carried to a very high development. Without the typical form and variety *subdecorata* these tw extremes would hardly be recognized as belonging to a single species

*Cristellaria costata*, var. *sublaevis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 50.9 | gy. s., m..... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 1 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m. ...... | Rare. |

**CRISTELLARIA BRADYI** Cushman.

Plate 48, figs. 1*a*, *b*.

*Cristellaria costata* H. B. Brady (in part?), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 555, pl. 71, fig. 8.

*Cristellaria bradyi* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 659.

*Description.*—Test ovate, thick, last few chambers more or less elongated; sutures hidden by the surface ornamentation, which consists of longitudinal rounded costae, more or less broken, especially toward the umbilical area, and becoming less distinct or entirely disappearing on the last-formed chambers; peripheral margin rounded; aperture radiate.

Length up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9133) from *Albatross* station D5313, in 150 fathoms (270 meters), China Sea off Hongkong, bottom temperature 53.6° F. (12.0° C.). Besides, it has occurred at various other stations in the China Sea, off Hongkong and off Formosa; off Jolo; Linapacan Strait; Palawan Passage; and between Jolo and Tawi Tawi.

These stations range in depth from 43 to 340 fathoms (78 to 622 meters), the average depth being 167 fathoms (305 meters). The bottom temperatures where given average 53.5° F. (11.8° C.).

This species differs from typical *C. costata* in that the longitudinal costae are the dominant ornamentation, running parallel with the axis of growth and are continuous over the whole test, while those of *C. costata* are limited to definite series, each set limited to a single chamber and independent of those of adjacent chambers.

*Cristellaria bradyi*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 5 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............. | Frequent. |
| [illegible] | U.S.N.M. | 8 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh......... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s. br., Co.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5336... | 11 37 45 N.; 119 46 00 E.. | 46 | ....... | s. m.......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co. s., m..... | Common. |
| [illegible] | U.S.N.M. | 1 | D5339... | 11 22 00 N.; 119 12 00 E.. | 52 | ....... | m............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5566... | 5 52 12 N.; 120 31 00 E.. | 244 | 52.5 | fne. s., sh.... | Rare. |

### CRISTELLARIA CASSIS (Fichtel and Moll).

Plate 49, figs. 2*a*, *b*.

"Cornu Hammonis" PLANCUS, Conch. Min., 1760, p. 120, pl. 1, fig. 11.
"Litui crispati et orbiculi" SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 6
pl. 56, figs. I, K, etc.
*Nautilus cassis* FICHTEL and MOLL, Test Micr., 1803, p. 95, pl. 17.
*Cristellaria cassis* LAMARCK, Tabl. Encycl. et Méthod., 1816, pl. 467, figs. 3*a*-*d*.-
H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 552, pl. 68, fig. 1

*Description.*—Test much compressed, ovate, early chambers regularly coiled, later ones becoming elongate and showing a tendenc toward uncoiling; umbilical region with prominent bosses and singl bosses appear on the sutures near the peripheral edge; umbilic region broadest in front view, wall otherwise smooth; sutures littl if at all depressed, of clear shell material; peripheral border with definite, very thin keel; aperture radiate, at the peripheral margin o the chamber.

Length up to 4 mm. or more.

*Distribution.*—This species occurred at a number of *Albatross* stations in the region from the following localities: Jolo Sea; off easter Palawan; several stations on the east coast of Luzon; Gulf of Tomin Celebes; Patiente Strait; off Bouro Island and Gulf of Boni.

The depth of these stations ranges from 480 to 901 fathoms (88 to 1,648 meters), the average depth being 614 fathoms (1,123 meters The bottom temperatures where given average 44.7° F. (7.0° C.).

At some of the stations off the east coast of Luzon this species wa abundant, but at the others it was represented by but few specimen It has not previously been recorded from the North Pacific.

*Cristellaria cassis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11891 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 11 00 E.. | 495 | 49.4 | gy. m. co., s. | Rare. |
| 15162 | U.S.N.M. | 2 | D5429... | 9 37 30 N.; 118 48 30 E.. | 766 | ....... | gn. m....... | Few. |
| 11893 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m....... | Few. |
| 11890 | U.S.N.M. | 10+ | D5467... | 13 35 37 N.; 123 37 18 E.. | 480 | ....... | gy. m....... | Abundant |
| 11894 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Few. |
| 11896 | U.S.N.M. | 10+ | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m............ | Abundant |
| 15163 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............ | Rare. |
| 11892<br>11895 | U.S.N.M. | 4 | D5630... | 0 56 30 S.; 123 04 00 E.. | 569 | ....... | co. s., m .... | Frequent. |
| 15164 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Rare. |
| 11897 | U.S.N.M. | 4 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Few. |
| 15165 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Rare. |

### CRISTELLARIA CASSINOIDES Cushman.

Plate 48, figs. 2 *a*, *b*.

*Cristellaria cassinoides* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 659.

*Description.*—Test elongate, much compressed, arcuate, earl chambers coiled, later ones uncoiling and forming an elongate growt several times the length of the coiled portion, inner margin slightly keeled, peripheral margin bluntly rounded; sutures with a raised portion along the central portion of the peripheral half of the test, surface otherwise smooth and unornamented; aperture radiate.

Length up to 5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9134) from *Albatross* station D5381, in 88 fathoms (161 meters), Raygay Gulf, Luzon. The species is fairly common in the area. Beside the type station it occurred at various stations: China Sea, off southern Luzon; east coast of Mindoro; off western Bohol; Sogod Bay, southern Leyte; off northwestern Panay; off Marinduque Island; Jolo Sea; north of Tawi Tawi; and Sibuko Bay, Borneo. At some of the stations specimens were abundant.

The stations range in depth from 88 to 554 fathoms (161 to 1,012 meters), the average being 236 fathoms (432 meters). The average bottom temperature is 51.9° F. (11.0° C.).

This is a species rather striking in its crozier form and peculiar but distinctive ornamentation.

*Cristellaria cassinoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 10+ | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5221... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m......... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Few. |
| [illegible] | U.S.N.M. | 4 | D5278... | 14 10 00 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5262... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m....... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5569... | 5 13 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............. | Few. |
| [illegible] | U.S.N.M. | 6 | D5592.. | 4 12 44 N.; 118 27 44 E.. | 305 | 48.3 | gn. m....... | Frequent. |

### CRISTELLARIA TUMIDO-COSTATA Cushman.

Plate 49, figs. 4 *a*, *b*.

*Cristellaria tumido-costata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 660.

*Description.*—Test very broadly biconvex, close-coiled; chambers comparatively few in the whorl; sutures marked by a series of very strong raised ribs uniting at the umbilicus; remaining surface between the sutures marked by a series of short, well-rounded, parallel costae, running obliquely to the axis of growth; peripheral portion of the test also marked by a series of costae parallel to the periphery, or nearly so; apertural face flattened or concave with a broad rim about the margin; aperture radiate at the peripheral angle of the chamber.

Diameter up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9136) from *Albatros* station D5570, in 330 fathoms (604 meters), north of Tawi Tawi bottom temperature 52.3° F. (11.2° C.). It also occurred at D554 in 232 fathoms (424 meters), off Jolo Island, bottom temperatur 53.5° F. (11.8° C.), and D5579, in 175 fathoms (320 meters), o Darvel Bay, Borneo, bottom temperature 55.3° F. (12.9° C.).

This is one of the most beautifully sculptured species found in th Philippine region.

*Cristellaria tumido-costata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11754 | U.S.N.M. | 1 | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk. sh... | Rare. |
| 9136 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne s., glob.. | Rare. |
| 11755 | U.S.N.M. | 1 | D5579... | 4 54 15 N.; 119 09 52 E.. | 175 | 55.3 | fne. s., Co... | Rare. |

### CRISTELLARIA TUMIDO-COSTATA, var. LABYRINTHICA Cushman.

Plate 50, figs. 1 *a*, *b*.

*Cristellaria tumido-costata*, var. *labyrinthica* CUSHMAN, Proc. U. S. Nat. Mu vol. 51, 1917, p. 660.

*Description.*—Variety differing from the typical in the shape, whic is more tumid, the periphery more broadly rounded than in the ty ical, and the ornamentation, which consists of a peripheral series costae, as in the typical; but the costae above the sutures obsolescen and the intermediary costae becoming the prominent sculpture, an becoming shorter, irregular, making a labyrinth-like network o raised ridges.

*Distribution.*—The variety was found only at *Albatross* statio D5567 in 268 fathoms (491 meters), north of Tawi Tawi, bottom tem perature 52.° F. (11.1° C.). Type (U.S.N.M. No. 9137).

Several specimens from this station show the relation between thi variety and the typical form.

*Cristellaria tumido-costata, var. labyrinthica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 9137<br>15306 | U.S.N.M.<br>U.S.N.M. | 1<br>2 | }D5567... | 5 48 00 N.; 120 33 45 E.... | 268 | 52.0 | fne. s........ | Rare. |

### CRISTELLARIA DORSO-COSTATA Cushman.

Plate 48, figs. 3 *a–c*.

*Cristellaria dorso-costata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 659.

*Description.*—Test composed of numerous chambers, the early ones close-coiled, the later ones becoming elongate and tending toward uncoiling; test thick, periphery broadly rounded; sutures little depressed; wall smooth except toward peripheral border, where there are several rounded costae running lengthwise of the test, becoming obsolete toward the later growth; aperture radiate.

Length up to 3.5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9135) from *Albatross* station D5268, in 170 fathoms (311 meters), off Batangas Bay. Specimens also occurred in material from the following stations: D5134, in 25 fathoms (46 meters), Sulu Archipelago near Basilan Island; D5141, in 29 fathoms (53 meters); D5143, in 19 fathoms (35 meters); D5144, in 19 fathoms (35 meters), all off Jolo; D5147, 21 fathoms (39 meters), off Siasi; D5152, 34 fathoms (62 meters), off Tawi Tawi; D5179, off Romblon, 37 fathoms (68 meters); and D5218, 20 fathoms (37 meters) between Burias and Luzon.

This seems to be a rather constant species and its characters of ornamentation with its partially uncoiled form should make it easily distinguished. Apparently it is found in the shallower, warmer waters among the islands of the Archipelago from the data obtainable.

*Cristellaria dorsa-costata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s......... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s.......... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s.......... | Abundant. |
| [illegible] | U.S.N.M. | 3 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s.......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh..... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Common. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | fne. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p.......... | Rare. |

### CRISTELLARIA COMPRESSA d'Orbigny.

*Cristellaria compressa* d'Orbigny, Foram. Foss. Vienne, 1846, p. 86, pl. 3, figs. 32, 33.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 538, pl. 104, figs. 15, 16.

*Description.*—Test elongate, much compressed, early portion close-coiled, later chambers becoming uncoiled and arcuate; sutures very slightly if at all depressed, of clear shell material; periphery of the test with a thin keel; aperture on the peripheral margin of the chamber, radiate.

Length up to 6 mm.

*Distribution.*—The only station from which this species was obtained is *Albatross* station D5670 in 1,181 fathoms (2,160 meters), i Macassar Strait, with a bottom temperature of 38.2° F. (3.4° C.). I apparently has not previously been recorded from the Pacific.

The specimen and those figured by Brady seem almost like an extreme form of *C. cassis* (Fichtel and Moll), as they have very simila characters except that this is much more uncoiled than is *C. cassi* and lacks the bosses of the ornamentation.

*Cristellaria compressa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11870<br>11867 | U.S.N.M. | 2 | D5670... | 1 19 00 S.; 118 43 00 E.... | 1,181 | 38.2 | gy. m........ | Rare. |

## CRISTELLARIA PAUCICOSTATA Cushman.

Plate 49, figs. 3 *a*, *b*.

*Cristellaria paucicostata* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 660.

*Description.*—Test much compressed, composed of few chamber peripheral border with a prominent keel, the earlier portion of th test with two sharp raised costae toward the periphery and parall to it, becoming obsolete on the later developed chambers; remainde of surface smooth; sutures slightly depressed; aperture radiat somewhat protruded.

Length up to 2 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9138) from *Albatros* station D5586 in 347 fathoms (635 meters), off Sibuko Bay, Borneo bottom temperature 44° F. (6.6° C.).

*Cristellaria paucicostata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 9138 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.... | 347 | 44.0 | gy. m...... | Rare. |

## CRISTELLARIA CREPIDULA (Fichtel and Moll).

Plate 50, figs. 4, 5.

*Nautilus crepidula* Fichtel and Moll, Test. Micr., 1803, p. 107, pl. 19, figs. g-
*Cristellaria crepidula* d'Orbigny, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 183 "Foraminifères," p. 64, pl. 8, figs. 17, 18.—H. B. Brady, Rep. Voy. *Challeng* Zoology, vol. 9, 1884, p. 542, pl. 67, figs. 17, 19, 20; pl. 68, figs. 1, 2.—Cushma Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 70, pl. 29, figs. 5, 6; pl. 31, figs. 2-5.

The following localities have given records for this species: Off Pujada Bay; China Sea, off southern Luzon and off Hongkong; Palawan Passage; Sogod Bay, southern Leyte; Darvel Bay and Sibuko Bay, Borneo; and Macassar Strait. These stations range in depth from 88 to 730 fathoms (161 to 1,335 meters), the average depth being 237 fathoms (434 meters) and the average bottom temperature being 50.3° F. (10.1° C.).

*Cristellaria crepidula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15307 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 52.8 | fne. gy. s., m. | Rare. |
| 11529 | U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E.... | 191 | 64.1 | sft. gy. m... | Rare. |
| 11530<br>11531 | U.S.N.M. | 4 | D5300... | 20 31 00 N.; 115 49 00 E.... | 265 | ....... | gy. m., s.... | Few. |
| 11532 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.... | 88 | ....... | crs. s., sh.... | Rare. |
| 11528 | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.... | 730 | 40.6 | co. s ........ | Rare. |
| 11527 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.... | 272 | 47.5 | gn. m........ | Rare. |

### CRISTELLARIA SCHLOENBACHI Reuss.

*Cristellaria schloenbachi* Reuss, Sitz. Akad. Wiss. Wien, vol. 46, 1862, p. 65, pl. 6, figs. 14, 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 539, pl. 67, fig. 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 77, pl. 36, fig. 6.

Specimens of this species have occurred at the following *Albatross* stations in the region: D5110, in 135 fathoms (247 meters), China Sea off southern Luzon, bottom temperature 59° F. (15° C.); D5112, in 177 fathoms (324 meters), same locality, bottom temperature 52.4° F.(11.3° C.); D5153, in 49 fathoms (90 meters), off Tawi Tawi; D5179, off Romblon, 37 fathoms (68 meters), bottom temperature 75.7° F. (24.2° C.); D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte, bottom temperature 52.8° F. (11.5° C.); D5277, in 80 fathoms (146 meters), China Sea off southern Luzon, bottom temperature 58.6° F. (14.7° C.); D5551, in 193 fathoms (353 meters) off Jolo, bottom temperature 53.3° F. (11.8° C.); and D5595 in 9 fathoms (16 meters), off Zamboanga, Mindanao.

*Cristellaria schloenbachi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15298 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.... | 135 | 59.0 | dk. gy. m... | Rare. |
| 11722 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 25 E.... | 177 | 52.4 | dk. gn. m... | Rare. |
| 11720 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E.... | 49 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.... | 37 | 75.7 | hrd. s........ | Rare. |
| [illegible]<br>11723 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.... | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.... | 80 | 58.6 | sh., p., s.... | Rare. |
| 11721 | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E.... | 193 | 53.3 | fne. s........ | Rare. |
| | | | D5595... | 6 54 00 N.; 122 04 30 E.... | 9 | ....... | .............. | |

### CRISTELLARIA TENUIS (Bornemann).

Plate 50, fig. 2.

*Marginulina tenuis* Bornemann, Zeitschr. deutsch. geol. Ges., vol. 7, 1855, p. 326, pl. 13, fig. 4.

*Cristellaria tenuis* Reuss, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 479, No. 1.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 535, pl. 66, figs. 21-23.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 315, pl. 61, fig. 2.

*Cristellaria perprocera* Schwager, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 241, pl. 6, fig. 84.

*Description.*—Test very long and slender, composed of a large number of chambers; early portion of the test compressed and coiled, the later portion becoming early uncoiled and gradually losing the compression until the final chambers are cylindrical and nodosarian; sutures of the early portion not incised, those of the later portion rather deeply constricted; wall smooth, aperture in the last-formed chamber, central, terminal, radiate.

Length up to 3.5 mm.

*Distribution.*—Specimens occurred at the following *Albatross* stations in the area: D5269, in 220 fathoms (403 meters), off Batangas Bay; D5301, in 208 fathoms (381 meters), China Sea, off Hongkong, bottom temperature 50.5° F. (10.2° C.); D5312, in 140 fathoms (250 meters), bottom temperature 57.5° F. (14.2° C.); also off Hongkong, D5622, in 275 fathoms (503 meters), between Gillolo and Makyan Islands; and D5648, in 559 fathoms (1,021 meters), Buton Strait.

The specimens I have had from this area are much like the specimens figured by Brady, perhaps more like them than like the other figures referred to above.

*Cristellaria tenuis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11781 | U.S.N.M. | 1 | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p..... | Rare. |
| 15309 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s..... | Rare. |
| 11783 | U.S.N.M. | 1 | D5312... | 21 30 00 N.; 116 32 00 E... | 140 | 57.5 | s., sml. sh.... | Rare. |
| 11784 | U.S.N.M. | 1 | D5622... | Makyan Island (NE.), N. 66° W. | 275 | ....... | gy. m........ | Rare. |
| 11782 | U.S.N.M. | 1 | D5648... | 5 35 00 S.; 122 20 00 E... | 559 | 39.2 | gn. m........ | Rare. |

### CRISTELLARIA HELICINA Cushman.

Plate 51, figs. 4 *a*, *b*.

*Cristellaria helicina* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 660.

*Description.*—Test unequally convex, close-coiled, chambers numerous, on one side coming to the umbilicus or nearly so, on the other coming only little farther than the periphery of the previous whorl; in face view subcarinate; apertural face unequal; sutures ornamented by raised areas, obsolescent at the periphery, but gradually increasing in size toward the umbilical end, becoming in some cases a distinct boss toward the umbilicus, those of the earlier whorls fusing into a partial ring about the umbilicus; main surface of the chambers smooth and unornamented; aperture radiate and projecting on the peripheral margin of the chamber.

Diameter up to 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9139) from *Albatross* station D5272, in 118 fathoms (203 meters), China Sea, off southern Luzon, bottom temperature 57.4° F. (14.1° C.). Besides at the type station the species was obtained from the following *Albatross* stations: D5113, in 159 fathoms (291 meters), China Sea, off southern Luzon; D5282, in 248 fathoms (454 meters), also China Sea, off southern Luzon, bottom temperature 47.4° F. (8.5° C.); D5301, in 208 fathoms (381 meters), China Sea, off Hongkong, bottom temperature 50.5° F. (10.2° C.); D5424, in 340 fathoms (622 meters), Jolo Sea, bottom temperature 50.4° F. (10.2° C.); D5529, in 441 fathoms (812 meters), between Siquijor and Bohol, bottom temperature 53° F. (11.7° C.); D5570, in 330 fathoms (604 meters), north of Tawi Tawi, bottom temperature 52.3° F. (11.2° C.); and D5650, in 540 fathoms (988 meters), Gulf of Boni, bottom temperature 40.1° F. (4.5° C.).

This is a striking species, with its unequally biconvex form, the difference in the two sides in regard to the length of the chambers and the ornamentation.

*Cristellaria helicina—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12615 | U.S.N.M. | 1 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m.... | Rare. |
| 9139<br>11615 | U.S.N.M. | 2 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh....... | Rare. |
| 11727 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Rare. |
| 11728 | U.S.N.M. | 5 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s..... | Few. |
| 11729 | U.S.N.M. | 3 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Rare. |
| 11735 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob.. | Rare. |
| 11730 | U.S.N.M. | 2 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob.. | Rare. |
| 11731 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Rare. |

### CRISTELLARIA HELICINOIDES Cushman.

Plate 51, figs. 1 *a*, *b*.

*Cristellaria helicinoides* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 661.

*Description.*—Test unequally biconvex, especially in the later chambers; earlier chambers close-coiled, biconvex, numerous; later chambers becoming developed more strongly on one side of the axis of growth and extending farther toward the umbilicus, giving the test a one-sided appearance; aperture in the last-formed chamber with a tubular neck; wall smooth and unornamented.

Diameter up to 2.5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9140) from *Albatross* station D5301, in 208 fathoms (381 meters), China Sea, vicinity of Hongkong, bottom temperature 50.5° F. (10.2° C.). It also occurred at D5523, northern Mindanao, D5529, in 441 fathoms (812 meters), between Siquijor and Bohol Islands, bottom temperature 53° F. (11.8° C.), and D5537, in 254 fathoms (465 meters), between Negros and Siquijor, bottom temperature 53.5° F. (11.8° C.).

This species, while not distinguished by marks of ornamentation, is nevertheless striking by its change of axis in later growth and consequent helicoid appearance.

*Cristellaria helicinoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 9140 | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy.m., s.... | Rare. |
| 11734 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ...... | ...... | .............. | Rare. |
| 11732 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy.m.,glob . | Rare. |
| 11733 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn.m........ | Rare. |

### CRISTELLARIA ITALICA (Defrance).

Plate 51, fig. 2.

*Saracenaria italica* DEFRANCE, Dict. Sci. Nat., vol. 32, 1824, p. 177; vol. 47, 1827, p. 344; Atlas, Conch., pl. 13, fig. 6.

*Cristellaria* (*Saracenaria*) *italica* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 293, No. 26; Modèles, 1826, Nos. 19 and 85.

*Cristellaria italica* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, pp. 21, 32, pl. 1, figs. 41, 42.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, figs. 17, 18, 20–23.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 78, pl. 33, fig. 3.

Specimens of this species occurred in material from more than 30 *Albatross* stations within the area: In the China Sea; Sulu Sea; off Romblon; Sogod Bay, southern Leyte; off Marinduque; east coast of Mindanao; off Panay; off southeastern Mindoro; Palawan Passage; both east and west coasts of Luzon; between Negros and Siquijor; off Sibuko Bay, Borneo; Gulf of Tomini, Celebes; Gulf of Boni; and Macassar Strait.

These stations range in depth from 38 to 752 fathoms (70 to 1,375 meters), with the average depth 288 fathoms (526 meters). The average bottom temperature was 50.2° F. (10.1° C.).

Some specimens were of extra size, measuring 6 to 8 mm. in length. At some stations they were very common, notably D5236, in 494 fathoms (903 meters), off eastern Mindanao, and D5220, in 50 fathoms (91 meters), between Marinduque and Luzon.

*Cristellaria italica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15337 | U.S.N.M. | 2 | D5116... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m.... | Few. |
| 15338 | U.S.N.M. | 2 | D5133... | Island off Panabutan Point, N. 52; W. 1.5 mi. | 38 | ....... | gn. m., s..... | Few. |
| 15339 | U.S.N.M. | 4 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| 11715 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Rare. |
| 15330 | U.S.N.M. | 2 | | | | | | |
| | | | D5219... | 13 21 00 N.; 122 18 45 E.. | 580 | 50.8 | gn. m........ | Rare. |
| 11714 | U.S.N.M. | 10 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Common. |
| 15340 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m........ | Few. |
| 11712<br>11716 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 15341 | U.S.N.M. | 8 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob . | Frequent. |
| 15342 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Rare. |
| 15343 | U.S.N.M. | 2 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s . | Few. |
| 15344 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Rare. |
| 15345 | U.S.N.M. | 2 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Few. |
| 15346 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s..... | Rare. |
| 15347 | U.S.N.M. | 6 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s..... | Few. |
| 15348 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Rare. |
| [illegible] | U.S.N.M. | 8 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co .... | Common. |
| [illegible] | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | co. s., m ..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ....... | bk. s........ | Few. |
| [illegible] | U.S.N.M. | 2 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Few. |
| 11713 | U.S.N.M. | 3 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 6 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m........ | Few. |
| 11717 | U.S.N.M. | 9 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Frequent. |
| 15354 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............. | Rare. |
| 15355 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m........ | Rare. |
| 15356 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Rare. |
| 15358 | U.S.N.M. | 2 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Few. |
| 15357 | U.S.N.M. | 3 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Few. |
| 15359 | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E .. | 305 | 43.3 | gn. m........ | Rare. |
| 15360 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Few. |
| 15361 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m........ | Rare. |

### CRISTELLARIA ITALICA (Defrance), var. ACUTO-CARINATA Cushman.

Plate 51, figs. 3*a*, *b*.

*Cristellaria italica* (DEFRANCE), var. *acuto-carinata* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 661.

*Description.*—Test similar to typical *C. italica* in its general characters, but the angles greatly extended in thin carinae from apex to aperture, the lines of growth being apparent even on the carinae. Length 3 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9141) from *Albatross* station D5523, off Mindanao, depth and bottom temperature not given.

This is rather extreme modification, with the thin carinae in side view nearly as wide as the body of the test.

*Cristellaria italica*, var. *acuto-carinata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 9141 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ........ | ........ | ............... | Rare. |

### CRISTELLARIA LATIFRONS H. B. Brady.

*Cristellaria latifrons* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 544, pl. 68, fig. 19; pl. 113, figs. 11 *a*, *b*.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 316, pl. 63, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 78, pl. 38, fig. 2.

Single specimens which may be referred to this species with some doubt have been obtained from the following stations: *Albatross* D5429, in 766 fathoms (1,401 meters), off eastern Palawan; D5445, east coast of Luzon, 383 fathoms (699 meters), bottom temperature 44.3° F. (6.8° C.); D5537, in 254 fathoms (465 meters), between Negros and Siquijor, bottom temperature 53.3° F. (11.8° C.); D5538, in 256 fathoms (468 meters), same locality and bottom temperature; D5551, in 193 fathoms (353 meters), off Jolo, bottom temperature 53.3° F. (11.8° C.); D5650, Gulf of Boni, in 540 fathoms (988 meters), bottom temperature 40.1° F. (4.5° C.).

The specimens from the first, third, and fourth stations had the chambers rather more closely set than the typical, and that from the last with the long apertural face, but rather more rounded than in the typical.

*Cristellaria latifrons*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15170 | U.S.N.M. | 1 | D5429... | 9 41 30 N.; 118 50 22 E.. | 766 | ........ | gn. m....... | Rare. |
| 15311 | U.S.N.M. | 1 | D5445... | 12 44 44 N.; 124 50 50 E.. | 383 | 44.3 | gn m., s..... | Rare. |
| 11745 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.3 | gn. m....... | Rare. |
| 1517 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Rare. |
| 11744 | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E.. | 193 | 53.3 | fne. s....... | Rare. |
| 15665 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |

## Genus MARGINULINA d'Orbigny, 1826.

### MARGINULINA GLABRA d'Orbigny.

Plate 41, fig. 1.

*Marginulinga glabra* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 259, No. 6; Modèles, 1826, No. 55.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 527, pl. 65, figs. 5, 6.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 313, pl. 60, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79, pl. 23, fig. 3.

This species was found in material from several *Albatross* stations. These include the following localities: Sulu Sea, off western Mindanao; Sogod Bay, southern Leyte Island; between Marinduque and Luzon; Batangas Bay; China Sea, off southern Luzon; between Siquijor and Bohol Islands; between Negros and Siquijor; and Gulf of Boni.

The various stations range in depth from 170 to 805 fathoms 311 to 1,472 meters), with an average depth of 375 fathoms (686 meters). The bottom temperatures range from 41.2° F. to 53.3° F. 5.1° to 11.8° C.), the average being 50.9° F. (10.5° C.).

There seem to be two more or less distinctive forms in the material examined—one with short globular chambers in the final chambers, the other with more pyriform and elongate ones with a slight neck. Material was insufficient to definitely determine the constancy of these differences, although specimens easily fell into one or other of the two groupings.

*Marginulina glabra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12320 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| 12319 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ........ | s., p......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ........ | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Rare. |
| 12316 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob.. | Rare. |
| 12315 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5657... | 3 19 40 S.; 120 36 30 E.. | 402 | 41.2 | gy. m....... | Rare. |

## MARGINULINA STRIATULA Cushman.

Plate 41, fig. 2.

*Marginulina striatula* Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 79, pl. 23, fig. 4.

Very typical material of this species was obtained from three *Albatross* stations: D5178, in 78 fathoms (143 meters), off Romblon; D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte Island, bottom temperature 52.8° F. (11.5° C.); and D5368, in 181 fathoms (331 meters), off Marinduque Island.

This species is easily distinguished from the preceding by form alone, as it has several chambers forming a moniliform series, with the axis straight and the coiled portion limited to the extreme base. The striations also help as well as the definite, well-developed neck with the four-radiate aperture.

*Marginulina striatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15322 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 12323 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| 13190 | U.S.N.M. | 1 | D5368... | 13 35 30 N.; 121 48 00 E.. | 181 | ....... | gy. m....... | Rare. |

### MARGINULINA COSTATA (Batsch).

Plate 41, figs. 5–8.

*Nautilus* (*Orthoceras*) *costatus* Batsch, Conch. des Seesandes, 1791, p. 2, pl. 1, figs. 1 *a–g*.

*Marginulina costata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 528, pl. 65, figs. 10–13.—Sherborn and Chapman, Journ. Roy. Micr. Soc., 1889, p. 487, pl. 11, fig. 28.—Terrigi, Mem. R. Com. Geol. Italia, vol. 4, 1891, p. 92, pl. 3, fig. 4.—Fornasini, Mem. R. Accad. Sci. Istit. Bologna, ser. 5, vol. 3, 1893, p. 434, pl. 2, fig. 6; ser. 5, vol. 4, 1894, pp. 213, 214, 217, pl. 2, figs. 18–21.—Jones, Pal. Soc., 1896, p. 235, pl. 1, fig. 21.—Silvestri, Mem. Pont. Accad. Nuovi Lincei, vol. 12, 1896, p. 200, pl. 1, fig. 9; vol. 17, 1900, p. 273, pl. 6, fig. 22.—Millett (part), Journ. Roy. Micr. Soc., 1902, p. 526 (not pl. 11, fig. 20).

*Marginulina raphanus* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 258, *No. 1*, pl. 10, figs. 7, 8; Modèles, 1826, No. 6.

*Description.*—Test elongate, subcylindrical, somewhat tapering, early chambers at least in the microspheric form in a partial coil, later ones uniserial and Nodosaria-like, chambers of early portion short and broad, later becoming comparatively longer; wall ornamented with 15 to 25 raised costae running lengthwise of the test.

Length up to 4 mm.

*Distribution.*—Typical material of this species was found in abundance in material from *Albatross* station D5178, in 78 fathoms (143 meters), off Romblon; and at D5277, 80 fathoms (146 meters), China Sea, off southern Luzon, bottom temperature 58.6° F. (14.7° C.).

In the large series obtained both microspheric and megalospheric specimens were present in considerable numbers, the latter predominating, as is usual where both forms are found together in quantity. In the microspheric form the early chambers are distinctly coiled, and in the uncoiling the oblique sutures can be traced for some considerable distance before sutures are developed at right angles to the axis of growth. In the megalospheric form various gradations are seen to the complete Nodosarian condition. Various stages are here shown in both the microspheric and megalospheric forms. This series is especially interesting in showing the relation between *Nodosaria* and *Marginulina*, as well as suggesting that a similar relation may be suspected between some of the oblique-sutured species of *Nodosaria* and certain similar uncoiled forms of *Cristellaria*.

*Marginulina costata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Common. |
| | U.S.N.M. | 10+ | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Common. |

### MARGINULINA PHILIPPINENSIS, new species.

Plate 53, figs. 2, 3*a*, *b*.

*Description.*—Test elongate, somewhat compressed, earliest chambers coiled, later ones uncoiled in a slightly curved series, all except the last two or three with a thin marginal carina, the last two or three chambers becoming inflated, nearly round in transverse section, well separated from one another, the last-formed one especially so; earliest portion with an irregular ornamentation consisting of numerous bosses or anastomosing costae; the remainder of the test with a few angled costae becoming often more numerous on the last-formed chamber; apertural slightly extended, aperture radiate.

Length 2 to 2.5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 14748), from *Albatross* station D5220, between Marinduque and Luzon, 50 fathoms (91 meters).

It has also occurred at station D5217, between Burias and Luzon, 105 fathoms (193 meters), bottom temperature, 63.1° F. (17.2° C.).

This is a common species, especially at D5220, where numerous specimens of a rather uniform character were obtained.

*Marginulina philippinensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Rare. |
| | U.S.N.M. | 10 | D5220... | 13 38 00 N.; 121 56 00 E... | 50 | ....... | sft. gn. m.... | Common. |

## Genus VAGINULINA d'Orbigny, 1826.

### VAGINULINA LEGUMEN (Linnaeus).

Plate 41, fig. 3.

*Nautilus legumen* LINNAEUS, Syst. Nat., ed. 10, 1758, p. 711, No. 248; ed. 12, 1767, p. 1164, No. 288.

*Vaginulina legumen* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 2.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 530, pl. 66, figs. 13-15.—FLINT, Rep.. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80, pl. 39, fig. 4.

The typical form with a rounded base or but slightly pointed and a considerably compressed contour occurred less commonly than th following variety. The typical form was found in material from th following stations: *Albatross* D5178, in 78 fathoms (143 meters), of Romblon; D5469, in 500 fathoms (914 meters), off Atulayan Island off east coast of Luzon; D5259, in 312 fathoms (571 meters), of northwestern Panay, bottom temperature 49.3° F. (9.6° C.); an D5580, in 162 fathoms (297 meters), near Darvel Bay, Borneo, botto temperature 55.8° F. (13.2° C.).

*Vaginulina legumen—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15314 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ...... | fne. s........ | Common. |
| 13351 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| 13347 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ...... | gn. m........ | Rare. |
| 13352 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |

### VAGINULINA LEGUMEN (Linnaeus), var. ELEGANS d'Orbigny.

Plate 41, fig. 4.

*Vaginulina elegans* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 257, No. 1; Modèle 1826, No. 54.—PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. vol. 16, 1865, p. 27, pl. 1, fig. 33.

*Vaginulina legumen* LINNAEUS, var. *elegans* FORNASINI, Boll. Soc. Geol. Ital vol. 5, 1886, p. 25, pl. 1, figs. 1 (?), 2–8.

*Description.*—Test elongate, tapering, basal end with a stout spin sutures very distinct, limbate, contour in end view less compress than in the typical; last-formed chambers more distinct in outlin than the earlier ones; wall smooth and transparent.

*Distribution.*—This variety was much more common, both in nu ber of specimens and number of stations at which it occurred, th the typical. Although found at eight stations, none of these ga specimens of the typical form. The variety was found in mater from the following stations: D5198, in 220 fathoms (403 meters), western Bohol, bottom temperature 53.9° F. (12.1° C.); D5222, 195 fathoms (356 meters), between Marinduque and Luzon; D52 in 494 fathoms (903 meters), Pacific Ocean, off east coast of Mindan bottom temperature 41.2° F. (5.1° C.); D5261, off southeast Mindoro, 145 fathoms (265 meters); D5268, in 170 fathoms (3 meters), Batangas Bay; D5349, in 730 fathoms (1,335 meters), Pa wan Passage, bottom temperature 40.6° F. (4.7° C.); D5467, 480 fathoms (878 meters), off Atulayan Island, east coast of Luzo and D5660, in 692 fathoms (1,266 meters), in Flores Sea.

It will be seen that this variety is well distributed over the ar and for the most part is in the deeper waters.

*Vaginulina legumen*, var. *elegans*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″   ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E... | 220 | 53.9 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 48 15 E... | 195 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 2 | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s., m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p........ | Rare. |
| [illegible] | U.S.N.M. | 5 | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | Co., s....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s.... | Rare. |

### VAGINULINA SPINIGERA H. B. Brady.

Plate 42, fig. 1.

*Marginulina* species, WHITEAVES, Rep. British Association, Brighton Meeting, Trans., 1872, p. 144.

*Vaginulina spinigera* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 63; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 531, pl. 67, figs. 13, 14.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 60, fig. 3.

*Description.*—Test compressed, tapering to the basal end which has two or more very long stout spines, chambers broad and short, early ones coiled, later becoming uniserial, but with the sutures angled; sutures distinct, limbate; aperture radiate.

*Length* without spines, up to 4 mm.

*Distribution.*—This species was obtained but once, *Albatross* station D5637, in 700 fathoms (1,280 meters), off Bouro Island. It has not been obtained from the North Pacific. Brady in his description gives it from the Ki Islands, among other localities. It was not found in the Philippine Archipelago.

*Vaginulina spinigera*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″   ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Rare. |

### VAGINULINA MARGARITIFERA (Batsch).

Plate 42, fig. 2.

*Nautilus (Orthoceras) margaritiferus* BATSCH, Conch. des Seesandes, 1791, p. 3, pl. 4, figs. 12*a*–*c*.

*Vaginulina margaritifera* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 532, pl. 66, fig. 16.

*Description.*—Test elongate, hardly tapering, initial end with a long slender spine, chambers numerous, limbate, sutures oblique, later chambers more distinct and somewhat inflated, smooth; apertur radiate, on the dorsal side of the chamber.

Length up to 4 mm.

*Distribution.*—The only station from which I have had this specie is *Albatross* D5612, in 750 fathoms (1,370 meters), just south of th Equator, in the Gulf of Tomini, Celebes.

The character of the last-formed chamber in the specimen figure here is rather unusual, but the earlier chambers are typical of thi species. It has not been recorded from the North Pacific.

*Vaginulina margaritifera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| 15318 | U.S.N.M. | 1 | D5612... | 0° 38′ 00″ S.; 121° 45′ 40″ E.. | 750 | °F.<br>...... | .............. | Rare. |

### VAGINULINA BRADYI Cushman.

Plate 42, figs. 3, 4 *a*, *b*.

*Vaginulina brukenthali* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 188 p. 532, pl. 66, figs. 18, 19 (not *V. brukenthali* Neugeboren).

*Vaginulina bradyi* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 661.

*Description.*—Test elongate, tapering toward the basal end, whic is armed with one or more short spines, somewhat compresse chambers numerous, distinct, early ones coiled, later ones in a linea series but with the sutures oblique throughout, limbate in the centr portion, not keeled, in transverse view ovate; aperture at the dors side of the chamber, radiate.

Length up to 4 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9142) from *Albatros* station D5580, in 162 fathoms (297 meters), Darvel Bay, Borneo bottom temperatures, 55.8° F. (13.2° C.). It also occurred at th following stations: D5313, in 150 fathoms (270 meters), China Se vicinity of Hongkong, bottom temperature 53.6° F. (12° C.); D531 in 148 fathoms (271 meters), bottom temperature 54.4° F. (12.4° C.) and D5318, in 340 fathoms (622 meters), both in the China Se vicinity of Formosa.

This species which was obtained by the *Challenger* in Torres Strai and referred by Brady to the species described by Neugeboren fro the Miocene of Transylvania seems to be distinct from that specie although it resembles it in certain respects. Our recent species lack the prominent keel of *B. brukenthali*, and the greater compressio of that species especially in the earlier portion. This new species evidently a tropical one of the Indo-Pacific region.

*Vaginulina bradyi*—*Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanse. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |

### VAGINULINA LINEARIS (Montagu).

Plate 42, figs. 5–8.

*Nautilus linearis* Montagu, Test. Brit., Suppl., 1808, p. 87, pl. 30, fig. 9.

*Dentalina legumen*, var. *linearis* Williamson, Recent Foramaminifera of Great Britain, 1858, p. 22, pl. 2, figs. 46–48.

*Vaginulina linearis* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 343, pl. 13, figs. 12, 13.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 532, pl. 67, figs. 10–12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 314, pl. 61, fig. 1.

*Description.*—Test elongate, hardly tapering, early chambers coiled, later ones becoming uniserial and finally Nodosarian; sutures of early portion rather indistinct, close set, not depressed, of later portion becoming oblique, then directly transverse and toward the apertural end becoming depressed and the chambers inflated; test except the last-formed chambers ornamented with a series of raised costae usually subspiral; last-formed chamber smooth and unornamented; aperture radiate somewhat extended; becoming central and terminal. Length up to 5 mm. or more.

*Distribution.*—This species was found at the following stations; *Albatross* D5133, in 38 fathoms (70 meters), Sulu Sea off western Mindanao; D5162, in 230 fathoms (420 meters), off Tawi Tawi group, bottom temperature 52.9° F. (11.6° C.); D5172, in 318 fathoms (582 meters), off Jolo; D5268 in 170 fathoms (311 meters), off eastern Mindoro; D5569, in 303 fathoms (554 meters), north of Tawi Tawi, bottom temperature 52.3° F. (11.2° C.); and D5585, in 476 fathoms (871 meters), off Sibuko Bay, Borneo, bottom temperature 41.1° F. (5° C.).

In certain respects the Philippine material differs from that of the Atlantic. The earlier portion is much more coiled and compressed and the latter portion in full grown specimens more Nodosarian. Recent Atlantic material which I have seems different and the Indo-Pacific material may be a distinct species. Both microspheric and megalospheric specimens occur in the material examined in about equal numbers.

*Vaginulina linearis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″    ° ′ ″ | | °F. | | |
| 15319 | U.S.N.M. | 1 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Rare. |
| 12643 | U.S.N.M. | 1 | D5162... | 5 10 00 N.; 119 47 30 E.. | 280 | 52.9 | crs. s., brk. sh | Rare. |
| 15320 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| 12641 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p........ | Rare. |
| 12640 | U.S.N.M. | 3 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| 12642 | U.S.N.M. | 2 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Rare. |

### VAGINULINA ACICULA Cushman.

Plate 40, figs. 1*a*, *b*.

*Vaginulina acicula* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 661.

*Description.*—Test elongate, slender, tapering from a point at the initial end to the largest chamber at the apertural end; initial en with one or more short spines; chambers very numerous, rathe indistinct in the early portion with oblique sutures, later becomin transverse and slightly depressed; wall smooth and polished aperture radiate, terminal.

Length up to 5 mm.

*Distribution.*—Type specimen (U.S.N.M. No. 9143) from *Albatros* station D5613, in 752 fathoms (1,375 meters) Gulf of Tomini, Celebe

This is a very unusual species in its very slender form, very taperin apex, and much larger apertural end, the aperture becoming centr and the last-formed chambers Nodosarian.

*Vaginulina acicula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″    ° ′ ″ | | °F. | | |
| 9143 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E.... | 752 | ....... | gy. m....... | Rare. |

### VAGINULINA PROTUMIDA (Schwager).

Plate 40, figs. 3*a*, *b*.

*Nodosaria protumida* SCHWAGER, *Novara*-Exped., Geol. Theil., vol. 2, 188 p. 227, pl. 6, fig. 59.

*Vaginulina protumida* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 8 pl. 30, fig. 1.

This species occurred at *Albatross* station D5236, in 494 fathom (903 meters), Pacific Ocean off east coast of Mindanao, botto temperature 41.2° F. (5.1° C.).

Schwager described this species from the Pliocene of Kar Nicob and I have previously recorded it off Japan.

The figured specimen is somewhat different from more typical ones in the aperture, but has the characteristic form and ornamentation.

*Vaginulina protumida—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne.gy.s..... | |

**VAGINULINA PATENS H. B. Brady.**

*Vaginulina patens* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 533, pl. 67, figs. 15, 16.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 80, pl. 32, figs. 7, 8.

Brady described this species from a *Challenger* station in 95 fathoms (174 meters) off the Philippines, and from Torres Strait. I have had specimens very typical in character from two *Albatross* stations, D5198, in 220 fathoms (403 meters), off western Bohol, bottom temperature 53.9° F. (12.1° C.) and D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte, bottom temperature 52.5° F. (11.5° C.).

*Vaginulina patens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn.m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s.,m...... | Rare. |

## Subfamily POLYMORPHININAE.

### Genus POLYMORPHINA d'Orbigny, 1826.

**POLYMORPHINA REGINA H. B. Brady, Parker, and Jones.**

*Polymorphina regina* H. B. Brady, Parker, and Jones, Trans. Linn. Soc., London, vol. 27, 1870, p. 241, pl. 41, figs. 32*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 571, pl. 73, figs. 11–13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 91, pl. 41, figs. 6, 7.

At three stations specimens of this species occurred, at the first station in considerable numbers. Brady records it from off Hongkong. It is a distinctive species. The following are the stations at which it has occurred: D5152, Sulu Archipelago, Tawi Tawi Group, 34 fathoms (62 meters); D5311, China Sea, vicinity Hongkong, 88 fathoms (161 meters); D5580, vicinity of Darvel Bay, Borneo, 162 fathoms (297 meters), bottom temperature 55.8° F. (13.2° C.).

Elsewhere this species is known from New South Wales, at Port Jackson, 6 fathoms (11 meters), Sydney Heads, and Port Stephens; Curtis Strait, Queensland; Bass Strait, 38 fathoms (70 meters); Storm Bay, Tasmania; Torres Strait, 155 fathoms (283 meters); off Ki Islands, 129 fathoms (236 meters); off Admiralty Islands, 17 fathoms (31 meters), and off Honolulu, Hawaiian Islands, 40 fathoms (73 meters) (Brady); off Kerguelen (Egger); Malay Archipelago (Millett); Altona Bay, Victoria, Australia (Chapman); off Ceylo (Dakin); Kerimba Archipelago, east coast of Africa (Heron-Alle and Earland); and east coast of Australia, 465 fathoms (850 meters (Sidebottom). Chapman has recorded it as a fossil from Australi

*Polymorphina regina—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12620 | U.S.N.M. | 2 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s....... | Abundant |
| 12619 | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| 12618<br>12621 | U.S.N.M. | 2 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |

### POLYMORPHINA PROBLEMA d'Orbigny.

Plate 54, figs. 3, 4.

*Polymorphina* (*Guttulina*) *problema* d'Orbigny, Ann. Sci. Nat., vol. 7, 18 p. 266, No. 14; Modèles, 1826, No. 61.—H. B. Brady, Rep. Voy. *Challeng* Zoology, vol. 9, 1884, p. 568, pl. 72, fig. 20, pl. 73, fig. 1.

At the following six stations this species has occurred but in fe numbers; the stations are for the most part in shallow water: D514 vicinity of Jolo, 19 fathoms (35 meters); D5144, vicinity of Jolo, 1 fathoms (35 meters); D5152, Sulu Archipelago, Tawi Tawi Group 34 fathoms (62 meters); D5178, vicinity of Romblon, 78 fathom (143 meters); D5318, China Sea, vicinity of Formosa, 340 fathom (622 meters); from exterior of pearl oyster, Jolo Jolo, Philippin Islands.

*Polymorphina problema—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12613 | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| 14998 | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| 12610 | U.S.N.M. | 2 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s....... | Rare. |
| 12612<br>12615 | U.S.N.M. | 7 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s......... | Few. |
| 12611 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 14999 | U.S.N.M. | 1 | .......... | Exterior pearl oyster, Jolo Jolo, P. I. | ....... | ....... | ............... | Rare. |

### POLYMORPHINA PROBLEMA d'Orbigny, var. INDICA, new variety.

Plate 52, figs. 1, 2; plate 53, figs. 1*a*, *b*.

*Description.*—Test large, broad, chambers comparatively few and thick-walled; sutures distinct but only slightly depressed; earlier chambers and the posterior half of the later ones with fine longitudinal costae, apertural end broadly rounded; aperture radiate.

Length up to 2.2 mm.

*Distribution.*—Type specimen (Cat. No. 16056, U.S.N.M.) from *Albatross* station D5579, vicinity of Darvel Bay, Borneo, in 175 fathoms (320 meters).

Several specimens were dredged at this station, all of this large robust variety, with partially ornamented chambers.

*Polymorphina problema*, var. *indica*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5579... | 4° 54′ 15″ N.; 119° 19′ 52″ E.. | 175 | °F.<br>55.3 | fne. s., Co.... | Rare. |

### POLYMORPHINA SORORIA Reuss.

*Polymorphina* (*Guttulina*) *sororia* REUSS, Bull. Acad. Roy. Belg., ser. 3, vol. 15, 1863, p. 151, pl. 2, figs. 25–29.

*Polymorphina sororia* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 562, pl. 71, figs. 15, 16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 88, pl. 30, fig. 3.

The only station at which specimens of this species were found is D5268, between Verde Island Passage and Batangas Bay, in 170 fathoms (311 meters).

*Polymorphina sororia*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 2 | D5268... | 13° 42′ 00″ N.; 120° 57′ 15″ E.. | 170 | °F.<br>....... | s., p......... | Rare. |

### POLYMORPHINA LACTEA (Walker and Jacob).

"*Serpula* tenuis ovalis laevis" WALKER and BOYS, Test. Min., 1784, p. 2, pl. 1, fig. 5.

"Polymorpha *subcordiformia* vel *oviformia*" SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 114, pl. 112, figs. 11, *nn*. etc.

*Serpula lactea* WALKER and JACOB, Adam's Essays, ed. 2, 1798, p. 634, pl. 24, fig. 4.

*Vermiculum lacteum* MONTAGU, Test. Brit., 1803, p. 522.

*Polymorphina lactea* MACGILLIVRAY, Moll. Aberd., 1843, p. 320.—H. B. BRADY, Rep. Voy. *Challenger*. Zoology, vol. 9, 1884, p. 559, pl. 71, fig. 11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 84, pl. 34, fig. 8.

The specimen belonging to this species was obtained from a singl station, D5311, China Sea, vicinity of Hongkong, 88 fathoms (161 meters).

*Polymorphina lactea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12665 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh..... | Rare. |

### POLYMORPHINA LACTEA, var. OBLONGA Williamson.

Plate 52, fig. 4.

*Polymorphina lactea*, var. *oblonga* Williamson, Recent Foraminifera of Great Britain, 1858, p. 71, pl. 6, figs. 149, 149*a*.

There is a single specimen which is very close to this variety as figured by Williamson. It is from *Albatross* station D5601, Gulf of Tomini, Celebes, in 765 fathoms, (1,399 meters).

*Polymorphina lactea*, var. *oblonga—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | 1 | D5601... | 1 13 10 N.; 125 17 05 E... | 765 | ....... | s., glob., ptr. | Rare. |

### POLYMORPHINA COMPRESSA d'Orbigny.

Polymorpha "*subovalia*" Soldani, Testaceographia, vol. 1, pt. 2, 1791, p. 114 figs. F. I., etc.

*Polymorphina compressa* d'Orbigny, Foram. Foss. Vienne, 1846, p. 233, pl. 12, figs. 32-34.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 565, pl. 72, figs. 9-11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 89, pl. 40, fig. 3.

From two stations specimens of this species were obtained: D5311, China Sea, vicinity of Hongkong, 88 fathoms (161 meters), and D5315, China Sea, vicinity of Formosa, 148 fathoms (271 meters), bottom temperature 54.4° F. (12.4° C.). The specimens were typical but rare.

*Polymorphina compressa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12617 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| 12616 | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Rare. |

### POLYMORPHINA GIBBA d'Orbigny.

"Polymorphina *Subcordiformia* vel *Oviformia*" SOLDANI, Testaceographia, vol. 1, pt. 2, 1791, p. 114, pl. 113, figs. ZZ, C, etc.

*Polymorphina (Globulina) gibba* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 226, No. 20; Modèles, 1826, No. 63.

*Polymorphina gibba* H. B. BRADY, PARKER, and JONES (part), Trans. Linn. Soc. London, vol. 27, 1870, p. 216, pl. 39, figs. 2*a*-*d*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 561, pl. 71, figs. 12*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 85, pl. 41, fig. 4.

This species occurred at but two stations, D5121, east coast of Mindoro, 108 fathoms (198 meters), and D5141, vicinity of Jolo, 29 fathoms (53 meters). Single specimens were obtained at each station.

*Polymorphina gibba—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s......... | Rare. |

### POLYMORPHINA ELEGANTISSIMA Parker and Jones.

Plate 54, figs. 1, 2.

*Polymorphina elegantissima* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 438.—H. B. BRADY, PARKER, and JONES, Trans. Linn. Soc., vol. 27, 1870, p. 231, pl. 40, figs. 15*a*-*c*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 566, pl. 72, figs. 12-15.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 90, pl. 38, fig. 1.

This species is by far the most abundant in the region, both in the number of stations at which it was obtained as well as in its individuals at different stations. It is especially abundant at many stations less than 100 fathoms in depth, ranging from 17 to 88 fathoms (31 to 161 meters), averaging 37 fathoms (68 meters). At the following stations it occurred at more than 100 fathoms (183 meters): D5315, China Sea, vicinity of Formosa, 148 fathoms (271 meters), bottom temperature 54.4° F. (12.4° C.); D5580, vicinity of Darvel Bay, Borneo, 162 fathoms (297 meters), bottom temperature 55.8° F. (13.2° C.); D5268, Verde Island Passage and Batangas Bay, 170 fathoms (311 meters), bottom temperature not given; D5282, China Sea, vicinity of southern Luzon, 248 fathoms (454 meters), bottom temperature 47.4° F. (8.5° C.); D5569, north of Tawi Tawi, 303 fathoms (554 meters), bottom temperature 52.3° F. (11.2° C.); D5172, vicinity of Jolo, 318 fathoms (582 meters), bottom temperature not given; D5318, China Sea, vicinity of Formosa, 340 fathoms (622 meters), bottom temperature not given.

This is very clearly a species of tropical coral reefs. A peculiar specimen of *Polymorphina* species is shown on plate 52, figure 5.

*Polymorphina elegantissima—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | °F. |  |  |
| 15268 | U.S.N.M. | 4 | D5133... | Island off Panabutan Point, N. 52° E., 1.5 miles. | 38 | 79.5 | gn. m., s.... | Few. |
|  |  |  | D5139... | 6 06 00 N.; 121 02 30 E.. | 20 | ....... | co. s......... | Few. |
| 13329<br>13327 | U.S.N.M. | 4 | D5143... | 6 06 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| 15262 | U.S.N.M. | 2 | D5145... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh .... | Few. |
| 14993 | U.S.N.M. | 1 | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh .... | Rare. |
| 15263 | U.S.N.M. | 3 | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co.s.......... | Few. |
| 15264 | U.S.N.M. | 10 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh.... | Abunda |
| 13328 | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Common |
|  |  |  | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh..... | Frequen |
| 15265 | U.S.N.M. | 3 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh ... | Common |
| 12622 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Abundan |
| 12623 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | ....... | hrd. s........ | Abundan |
|  |  |  | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p ........ |  |
| 15266 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s.... | Rare. |
| 12624 | U.S.N.M. | 5 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh ... | Frequent. |
| 15267 | U.S.N.M. | 3 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh ........ | Few. |
| 12625 | U.S.N.M. | 6 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Abundan |
| 12666 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| 14994 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 14995 | U.S.N.M. | 2 | .......... | Jolo Jolo, Philippine Islands | ....... | ....... | .............. | Rare. |
| 14996 | U.S.N.M. | 1 | .......... | Tara Island, Philippine Islands. | ....... | ....... | .............. | Rare. |

### POLYMORPHINA OBLONGA d'Orbigny.

Plate 52, fig. 3.

*Polymorphina oblonga* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 232, pl. 12, fi 29–31.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 569, 73, figs. 2–4.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 319, pl. 67, fig. 5. CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 88, pl. 37, fig. 6.

Next to *Polymorphina elegantissima* this species has occurred more stations than any other species of the genus. With the e ception of a single station, D5151, Sulu Archipelago, Tawi Ta group, 24 fathoms (44 meters), the stations are all in depths fro 148 to 500 fathoms (271 to 914 meters), the average depth 30 fathoms (560 meters). The bottom temperatures were given ran from 41.1° to 54.4° F. (5° to 12.4° C.), average 47.9° F. (8.8° C. Specimens at most of the stations were rare.

*Polymorphina oblonga—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | °F. |  |  |
| 12604 | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh .... | Rare. |
| 12607 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p ........ | Few. |
| 12603 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh ........ | Rare. |
| 12605 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 12608 | U.S.N.M. | 1 | D5409... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Rare. |
| 14997 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............. | Rare. |
| 12606 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Rare. |
| 12609 | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44 | gy. m........ | Rare. |

## Subfamily Uvigerininae.

### Genus UVIGERINA d'Orbigny, 1826.

### UVIGERINA PIGMEA d'Orbigny.

Plate 55, fig. 1.

"*Polymorpha Pineiformia*" Soldani, Testaceographia, vol. 1, pt. 2, 1791, pl. 130, figs. *ss, tt.*

*Uvigerina pigmea* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 269, pl. 12, figs. 8, 9; Modelès, 1826, No. 67.

*Uvigerina pygmaea* d'Orbigny, Foram. Foss. Vienne, 1846, p. 190, pl. 11, figs. 25, 26.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 575, pl. 74, figs. 11-14.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 96, pl. 42, fig. 1; pl. 44, fig. 5.

Although there are apparently several forms or species in the region with coarsely costate tests no attempt has been made here to separate them. They have occurred at numerous stations, depths varying from 88 to 1,449 fathoms (161 to 2,595 meters), and the bottom temperatures were given from 39.2° to 52.8° F. (4° to 11.5° C.). Many of the specimens were like those figured by Brady, without name in the *Challenger* report.

*Uvigerina pigmea—Material examined.*

| Cat. No. | Coll. | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 8 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m.... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Few. |
| | | | D5216... | 12 52 00 N.; 123 23 30 E.. | 215 | ........ | gn. m........ | Frequent. |
| [illegible] | U.S.N.M. | 4 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m........ | Few. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ........ | s., p......... | Few. |
| | | | D5269... | 13 39 50 N.; 120 58 30 E.. | 220 | ........ | fne. s., p..... | Frequent. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ........ | gy. m., s..... | |
| [illegible] | U.S.N.M. | 5 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ........ | s., br. Co..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ........ | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5502... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 1 | Nero 843. | 15 21 00 N.; 122 01 15 E.. | 1,449 | ........ | gn. m........ | Rare. |

### UVIGERINA TENUISTRIATA Reuss.

Plate 55, fig. 2.

*Uvigerina tenuistriata* Reuss, Sitz. Akad. Wiss. Wien, vol. 52, 1870, p. 485.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 574, pl. 74, figs. 4-7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 95, pl. 42, fig. 4.

Although this species occurred at numerous stations in the Philippines proper, it occurred but twice in the region to the south—D5590, vicinity of Sibuko Bay, Borneo, 310 fathoms (567 meters), bottom temperature 44.3° F. (6.8° C.), and D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature 47.5° F. (8.6° C.). The

(1,357 meters), Sulu Sea, off southern Panay; D5300, China Sea, off southern Luzon, 265 fathoms (485 meters); and D5318, 340 fathoms (622 meters), China Sea, off Formosa. It has been recorded in the Pacific from off the Hawaiian Islands.

*Uvigerina striata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14962 | U.S.N.M. | 1 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Rare. |
| 13108 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 12409<br>13120 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |

### UVIGERINA SELSEYENSIS Heron-Allen and Earland.

*Uvigerina selseyensis* HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1909 p. 437, pl. 18, figs. 1–3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 93, pl. 42, fig. 5.

From a single station this species was found, and the specimen even more like the typical than that I have figured previously. It is from D5575, north of Tawi Tawi, 315 fathoms (580 meters), bottom temperature 52.3° F. (11.2° C.). The depth agrees very well with that from which I have recorded the species previously in the North Pacific.

*Uvigerina selseyensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | 1 | D5575... | 5 28 30 N.; 120 02 27 E.. | 315 | 52.3 | co. s......... | Rare. |

### UVIGERINA BRUNNENSIS Karrer.

*Uvigerina brunnensis* KARRER, Abh. k. geol. Reichs., vol. 9, 1877, p. 385, pl. 16*b*, fig. 49.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 577, pl. 75, figs. 4, 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 97, pl. 43, fig. 2.

Specimens which were very much like the *Challenger* figures of this species were found at the following few stations: D5115, Balayan Bay and Verde Island Passage, 340 fathoms (622 meters); D5523, northern Mindanao and vicinity; D5606, Gulf of Tomini, Celebes, 834 fathoms (1,525 meters); D5609, north of Celebes, 1,092 fathoms (1,998 meters), bottom temperature 36.3° F. (2.3° C.); D5626, between Gillolo and Kayoa Islands, 265 fathoms (485 meters); and D5652, Gulf of Boni, 525 fathoms (960 meters), bottom temperature 41.2° F. (5.1° C.).

*Uvigerina brunnensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 9 | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ....... | ............... | Frequent. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............... | |
| [illegible] | U.S.N.M. | 2 | D5606... | 0 16 28 N.; 121 83 80 E.. | 834 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5609... | 0 11 00 S.; 121 16 00 E.. | 1,092 | 36.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5626... | 0 07 30 N.; 127 29 00 E.. | 265 | ....... | gy. m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m....... | Rare. |

### UVIGERINA ACULEATA d'Orbigny.

Plate 55, fig. 6.

*Uvigerina aculeata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 191, pl. 11, figs. 27, 28.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 578, pl. 75, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 100, pl. 43, fig. 4.

Next to *Uvigerina schwageri* this is the most common species in the region, being found at a large number of stations well scattered throughout the area covered by the dredgings. The depths range from 234 to 805 fathoms (428 to 1,472 meters), and the bottom temperatures from 41.1° to 56.4° F. (4.5° to 13.5° C.). The average depth is 440 fathoms (805 meters), and the average bottom temperature 48.4° F. (9.1° C.).

The specimens are excellent ones and at many stations are abundant, often the whole test covered with the long spinose growth shown in the figures given by Brady in the *Challenger* Report.

*Uvigerina aculeata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | sft. gn. m... | Few. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 5 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m.... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5259... | 11 57 30 N. 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Abundant. |
| [illegible] | U.S.N.M. | 5 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Frequent. |
| | | | D5300... | 20 31 00 N., 115 49 00 E.. | 265 | ....... | gy. m., s.... | Few. |
| | | | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co., s........ | Few. |
| [illegible] | U.S.N.M. | 2 | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m., co. s. | Few. |
| [illegible] | U.S.N.M. | 3 | D5445... | 12 44 42 N.: 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Few. |
| | | | D5447... | 18 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy. m., fne. s. | Few. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 2 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 2 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 4 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Frequent. |
| [illegible] | U.S.N.M. | 8 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gy. m., s.... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m....... | Few. |
| [illegible]<br>[illegible] | U.S.N.M.<br>U.S.N.M. | 3<br>2 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Few. |

### UVIGERINA ASPERULA Czjzek.

Plate 54, fig. 5; plate 55, fig. 8.

*Uvigerina asperula* Czjzek, Haidinger's Nat., Abh. 2, 1848, p. 146, pl. 13, figs. 14, 15.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 578, pl. 75, figs. 6-8.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 320, pl. 68, fig. 4.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 101, pl. 43, fig. 1.

This species is almost as frequent in its occurrence as *Uvigeri* *aculeata* and has a similar distribution in the region. The range o depth is the same, 234 to 901 fathoms (428 to 1,648 meters), the aver age 445 fathoms (814 meters) being slightly more. The bottom tem peratures range from 38.2° to 56.4° F. (3.4° to 13.5° C.) with th average 46.5° F. (8.0° C.). This is slightly lower also than for U *aculeata*. One station was from 24 fathoms (44 meters).

*Uvigerina asperula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14965 | U.S.N.M. | 2 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Rare. |
| 12416 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m...... | Few. |
| | | | D5210... | 11 49 55 N.; 124 28 05 E.. | 393 | 43.7 | gn. m., s...... | Rare. |
| 12417 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| 12418 | U.S.N.M. | 3 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Few. |
| 14966 | U.S.N.M. | 4 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s...... | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s...... | Few. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s.......... | Few. |
| 12420 | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s...... | Rare. |
| 15269 | U.S.N.M. | 2 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob.. | Few. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | ....... | gn. m......... | Few. |
| 15270 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s. glob., ptr.. | Few. |
| 14967 | U.S.N.M. | 3 | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m......... | Few. |
| 12419 | U.S.N.M. | 10+ | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh.... | Abundar |
| | | | D5648... | 5 35 00 S.; 122 20 00 E.. | 559 | 39.2 | gn. m......... | |
| 14968 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | ....... | gn. m......... | Few. |
| 12421 | U.S.N.M. | 2 | D5652... | 4 35 00 S.; 121 23 06 E.. | 525 | 41.2 | gn. m......... | Few. |
| 14969 | U.S.N.M. | 3 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m......... | Few. |
| | | | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m......... | Rare. |
| 14970 | U.S.N.M. | 2 | H4937... | 5 32 50 N.; 120 49 10 E.. | 385 | 38.2 | gy. m......... | Few. |

### UVIGERINA AMPULLACEA H. B. Brady.

Plate 55, fig. 7.

*Uvigerina asperula* Czjzek, var. *ampullacea* H. B. Brady, Rep. Voy. *Challeng* Zoology, vol. 9, 1884, p. 579, pl. 75, figs. 10, 11.—Flint, Rep. U. S. Nat. Mu 1897 (1899), p. 320, pl. 68, fig. 5.

*Uvigerina ampullacea* Egger, Abh. kön. bay. Akad. Wiss. München, Cl.II, vol. 1 1893, p. 313, pl. 9, fig. 37.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 191 p. 102, pl. 42, fig. 3.

Although less common than some of the other species this h occurred at too large a number of stations to list separately. Th range in depth from 265 to 885 fathoms (485 to 1,618 meters), ave age 550 fathoms (1,005 meters), and bottom temperatures from 38. to 56.4° F. (3.4° to 13.5° C.), the average 45.6° F. (7.5° C.).

In the region this species has occasionally occurred with *U. asperu* but more often not, and on the whole they seem well distinguish from one another.

*Uvigerina ampullacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D52365.. | 6 04 20 N.; 120 59 20 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Frequent. |
| [illegible] | U.S.N.M. | 9 | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.8 | gy. m., glob.. | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Few. |
| [illegible] | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Few. |
| [illegible] | U.S.N.M. | 2 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s......... | Few. |
| | | | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob.. | Few. |
| [illegible] | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5648... | 5 35 00 S.; 122 20 00 E.. | 559 | 39.2 | gn. m......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy. m., s..... | Few. |
| [illegible] | U.S.N.M. | 6 | H4937... | 5 32 50 S.; 120 49 10 E.. | 885 | 38.2 | gy. m........ | Frequent. |

### UVIGERINA INTERRUPTA H. B. Brady.

*Uvigerina interrupta* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 60, pl. 8, figs. 17, 18; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 580, pl. 75, figs. 12-14.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 103, pl. 44, fig. 1.

At only five stations, four of which were in the southern part of the region, this species has occurred sparingly. The depths are rather less than recorded for the North Pacific. The stations are as follows: D5185, between Panay and Negros, 638 fathoms (1,167 meters), bottom temperature 49.8° F. (9.8° C.); D5624, between Gillolo and Makyan Islands, 288 fathoms (527 meters); D5637, Pitt Passage, 700 fathoms (1,280 meters); D5650, Gulf of Boni, 540 fathoms (988 meters), bottom temperature 40.1° F. (4.5° C.); D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature 47.5° F. (8.6° C.).

*Uvigerina interrupta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ′ | | ° F. | | |
| [illegible] | U.S.N.M. | 7 | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn. m........ | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5624... | 0 12 15 N.; 127 29 30 E.. | 288 | ....... | fne. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m........ | Rare. |
| | | | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | |
| [illegible] | S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m........ | Rare. |

### UVIGERINA CANARIENSIS d'Orbigny.

"Testae pineiformes minusculae" Soldani, Testaceographia, vol. 2, 1798, p. 8, pl. 4, figs. E, F, G, H.

*Uvigerina nodosa*, var. β, d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 269, No. 3.

*Uvigerina canariensis* d'Orbigny, Foram. Canaries, 1839, p. 138, pl. 1, figs. 25-27.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 573, pl. 74, figs. 1-3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 92, pl. 42, fig. 6.

The only station at which this species was noted is D5300, China Sea, vicinity of southern Luzon, in 265 fathoms (485 meters).

*Uvigerina canariensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | D5300... | ° ′ ″ ° ′ ″<br>20 31 00 N.; 115 49 00 E... | 265 | ° F.<br>....... | gy. m., s.... | |

UVIGERINA SCROBICULATA, new species.

*Description.*—Test elongate, polygonal, early chambers generall triserial in a three-sided test; the angles rounded, latter half of the tes triserial and tapering toward the apertural end; last-formed chamb and sometimes the one preceding somewhat distinct from the gener mass of the test, triangular at the base, and broadest thence taperin rapidly to the aperture, which is rounded with a slight tubular nec and a very slightly developed phialine lip; sutures distinct but no greatly depressed, surface smooth except fo a finely scrobiculate condition, due to nume ous irregular pittings of the surface; colo yellowish- or brownish-white.

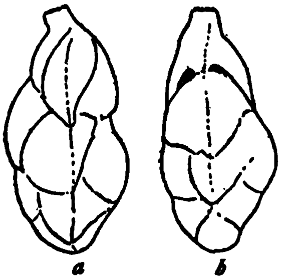

FIG. 10.—UVIGERINA SCROBICULATA, NEW SPECIES. × 50. a, b, TWO VIEWS FROM DIFFERENT ANGLES. FROM STATION D5333.

Length up to 1.5 mm.

*Distribution.*—Type-specimen (Cat. N 16057, U.S.N.M.), from *Albatross* static D5333, in 310 fathoms (567 meters), Mindo Strait, where the species is common.

This has some of the characters of *U. ang losa* and *U. schwageri* but is distinct fro either. The almost fusiform shape, broa est in the middle and tapering towa either end with the generally triangular section, both of the who test and of the chambers with the finely scrobiculate surface, wi distinguish it.

*Uvigerina scrobiculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundar |
|---|---|---|---|---|---|---|---|---|
| 16057 | U.S.N.M. | 1 | D5333... | ° ′ ″ ° ′ ″<br>12 26 30 N.; 120 37 45 E... | 310 | ° F.<br>....... | s............ | Commor |

## Genus SIPHOGENERINA Schlumberger, 1883.

### SIPHOGENERINA COLUMELLARIS (H. B. Brady).

Plate 56, fig. 1.

*Sagrina columellaris* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 581, pl. 75, figs. 15–17.

*Siphogenerina columellaris* EGGER, Abh. kön. bay. Akad. Wiss. Münche Cl. II, vol. 18, 1893, p. 316, pl. 9, figs. 28, 31, 33.—CUSHMAN, Bull. 71, U. S. N Mus., pt. 3, 1913, p. 104, pl. 47, figs 2, 3.

Typical specimens of this species were obtained from material dredged at the following stations: D5133, Sulu Sea off western Mindanao, 38 fathoms (70 meters); D5172, vicinity of Jolo, 318 fathoms (582 meters); D5218, between Burias and Luzon, 20 fathoms (37 meters); D5236, Pacific Ocean east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5268, Verde Island Passage and Batangas Bay, 170 fathoms (311 meters); D5469, east coast Luzon, San Bernardino Strait to San Miguel Bay, 500 fathoms (914 meters); D5572, north of Tawi Tawi, 334 fathoms (611 meters); bottom temperature 52.3° F. (11.2° C.); D5638, Bouro Island (south) and vicinity, 517 fathoms (946 meters).

*Siphogenerina columellaris—Material examined.*

| Ca. N. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5133... | Island off Panabutan Point N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | |
| | U.S.N.M. | 2 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Rare. |
| | U.S.N.M. | 1 | D5218... | 13 11 15 N. 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |
| | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |
| | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | Rare. |
| | | | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | |
| | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s.... | Rare. |

### SIPHOGENERINA BIFRONS (H. B. Brady).

Plate 56, figs. 2, 3.

*Sagrina bifrons* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 64; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 582, pl. 75, figs. 18–20.

*Siphogenerina* (*Sagrina*) *bifrons* EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, figs. 25, 26, 29.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 105, pl. 45, figs. 1, 2, 5–7.

This species occurred at a number of stations in the region as follows: D5121, east coast of Mindoro, 108 fathoms (198 meters); D5138, vicinity of Jolo, 19 fathoms (35 meters); D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); D5242, Pujada Bay and vicinity, 191 fathoms (350 meters), bottom temperature 64.1° F. (17.8° C.); D5281, China Sea, vicinity southern Luzon, 201 fathoms (368 meters), bottom temperature 50.4° F. (10.2° C.); D5318, China Sea, vicinity of Formosa, 340 fathoms (622 meters); D5445, east coast of Luzon, 383 fathoms (699 meters), bottom temperature 44.3° F. (6.8° C.); D5538, between Negros and Siquijor, 256 fathoms (468 meters), bottom temperature 53.3° F. (11.8° C.); D5630, south of Patiente Strait, 569 fathoms (1,040 meters); D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature 47.5° F. (8.6° C.).

It will be seen that the depths agree well with those already published from the North Pacific, and it is also interesting that the bottom temperatures are comparatively high, as was the case in the stations noted off Japan. With these added stations we now kno considerable about the distribution of this species, which was described by Brady from a single *Challenger* station off Japan. It range can now be well filled in from off southern Japan to Australi including the Malay Archipelago, and probably occurs widely di tributed among the East Indian and Oceanic Islands. Chapma records it from off Funafuti.

*Siphogenerina bifrons—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13141 | U.S.N.M. | 10 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Common. |
| 14938 | U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E... | 191 | 64.1 | sft.gy.m..... | Rare. |
| 13140 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |
| 14939 | U.S.N.M. | 3 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 14940 | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Rare. |
| 13133 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| 13137 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 06 00 E... | 569 | ....... | oo. s., m..... | Rare. |
| 13139<br>13143 | U.S.N.M. | 10 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m....... | Commo |
| 12751 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Rare. |
| 13138 | U.S.N.M. | 8 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., Co....... | Commo |
| 14907 | U.S.N.M. | 1 | Nero 849. | ........................ | ...... | ....... | ............ | Rare. |

### SIPHOGENERINA BIFRONS (H. B. Brady), var. STRIATULA Cushman.

Plate 56, fig. 4.

*Siphogenerina bifrons* (H. B. Brady), var. *striatula* Cushman, Proc. U. S. N Mus., vol. 51, 1917, p. 662.

*Description.*—Differing from the typical in having the surface wi numerous longitudinal striations, rather more elongate, and t central indented portion deeper and more defined.

At the following stations the variety occurred, sometimes with t typical but usually much more numerous: H4898, Sulu Sea off weste Mindanao, 221 fathoms (405 meters); D5110, China Sea, off southe Luzon, 135 fathoms (247 meters), bottom temperature 59° F. (15° C D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,0 meters), bottom temperature 52.8° F. (11.5° C.); D5236, Pacif Ocean, east coast Mindanao, 494 fathoms (903 meters), botto temperature 41.2° F. (5.1° C.); D5268, Verde Island Passage an Batangas Bay, 170 fathoms (311 meters); D5445, east coast Luzon, San Bernardino Strait to San Miguel Bay, 383 fathoms (69 meters), bottom temperature 44.3° F. (6.8° C.); D5523, norther Mindanao and vicinity; D5621, between Gillolo and Makyan Island 298 fathoms (545 meters); D5636, Pitt Passage, 1,262 fathoms (2,30 meters); D5638, Bouro Island (south) and vicinity, 517 fathoms (946 meters); D5666, Macassar Strait, 272 fathoms (498 meters), bottom temperature 47.5° F. (8.6° C.).

Both microspheric and megalospheric forms occur, the megalospheric more common. At the only station at which a record was kept 11 were megalospheric and two were microspheric.

*Siphogenerina bifrons, var. striatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5110... | 12 59 20 N.; 120 75 45 E... | 135 | 50.0 | dk. gy. m... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| [illegible] | U.S.N.M. | 3 | | | | | | |
| [illegible] | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | p., s., sh..... | Common. |
| [illegible] | U.S.N.M. | 3 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5621... | 0 15 09 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s | Rare. |
| [illegible] | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 42 30 E... | 1,262 | ....... | gy. m., fne. s | Rare. |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 10+ | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m., glob. | Common. |

### SIPHOGENERINA DIMORPHA (Parker and Jones).

Plate 56, fig. 8.

*Uvigerina (Sagrina) dimorpha* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 420, pl. 18, fig. 18.

*Sagrina dimorpha* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 582, pl. 76, figs. 1–3.

*Siphogenerina dimorpha* Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 30.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 106, pl. 45, figs. 3, 4.

This species was the least common of any of the genus, occurring as single specimens or at most few. The following records are all that were noted: D5300, China Sea, vicinity of southern Luzon, 265 fathoms (485 meters); D5601, Gulf of Tomini, Celebes, 765 fathoms (1,399 meters); and D5666, Macassar Strait, 272 fathoms (498 meters). The last station had a bottom temperature of 47.5° F. (8.6° C.), the others not being recorded.

*Siphogenerina dimorpha—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° P. | | |
| 13114 | U.S.N.M. | 1 | D5300... | 20 31 60 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Rare. |
| 13116 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s., glob., ptr. | Rare. |
| 13115 | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

### SIPHOGENERINA STRIATA (Schwager).

Plate 56, fig. 5.

*Dimorphina striata* Schwager, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 251, pl. 7, fig. 99.

*Sagrina striata* Schwager, Boll. R. Com. geol. Ital., vol. 8, 1877, p. 25, pl., fig. 35.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 584, pl. 75, figs. 25, 26.

*Siphogenerina* (*Sagrina*) *striata* Egger?, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 316, pl. 9, figs. 32, 34, 35, 64, 65.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 107, pl. 47, figs. 4, 5.

Specimens have occurred at numerous stations, at some of which they could be called common. The species seems to be different from either form of *S. raphanus*, the costae being less independent of the chambers than in *S. raphanus* and the sutures marking well-defined limits even in the costae. The neck is invariably short or wanting, no lip being present. It was found at the following stations: H4898, Sulu Sea off western Mindanao, 221 fathoms (405 meters); D5178, vicinity of Romblon, 78 fathoms (143 meters); D5201, Sogod Bay, southern Leyte Island, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); D5236, Pacific Ocean, east coast Mindanao, 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.); D5242, Pujada Bay and vicinity, 191 fathoms (350 meters), bottom temperature 64.1° F. (17.8° C.); D5268, Verde Island Passage and Batangas Bay, 170 fathoms (311 meters); D5318 China Sea, vicinity of Formosa, 340 fathoms (622 meters); D5443 east coast of Luzon, San Bernardino Strait to San Miguel Bay, 241 fathoms (441 meters), bottom temperature 51.3° F. (10.7° C.) D5575, north of Tawi Tawi, 315 fathoms (580 meters), bottom temperature 52.3° F. (11.2° C.).

*Siphogenerina striata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13124 | U.S.N.M. | 8 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s......... | Common. |
| 13123<br>12750 | U.S.N.M. | 6 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m...... | Common. |
| 14927 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |
| 14928 | U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E.. | 191 | 64.1 | sft. gy. m..... | Rare. |
| 12749 | U.S.N.M. | 3 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | p., s., sh..... | Few. |
| 13122 | U.S.N.M. | 3 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co..... | Few. |
| | | | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh..... | |
| 13121 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E.. | 315 | 52.3 | Co., s......... | Rare. |
| 14923 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob.. | Rare. |

### SIPHOGENERINA RAPHANUS (Parker and Jones).

Plate 56, fig. 7.

*Uvigerina* (*Sagrina*) *raphanus* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 364, pl. 18, figs. 16, 17.

*Sagrina raphanus* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 585, pl. 75, figs. 21–24.

*Siphogenerina (Sagrina) raphanus* EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 317, pl. 9, fig. 36.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 108, pl. 46, figs. 1–5.

This species is the most common of the genus in the region, occurring at numerous stations well scattered over the region, and from Apra Bay, Guam. In depth the stations range from 78 to 554 fathoms (143 to 1,012 meters), and the bottom temperatures from 47.5° F. to 59° F. (8.6° C. to 15° C.). All but one station had a bottom temperature above 51° F. (10.5° C.). In its typical form this species has a tapering shape, acute at the initial end, with a narrow neck and well-developed phialine lip, with a few strong costae, independent of the sutures.

*Siphogenerina raphanus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 8 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne.s........ | Common. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 53.8 | gy.s.,m..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 16 E... | 170 | ....... | s.,p........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne.s........ | Few. |
| [illegible] | U.S.N.M. | 2 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............ | Few. |
| [illegible] | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s.,br. Co.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5420... | 9 49 35 N.; 123 45 00 E... | 127 | 59.0 | ............. | Few. |
| [illegible] | U.S.N.M. | 1 | D5443... | 12 43 05 N.; 125 01 00 E... | 241 | 51.3 | co.s.,sh..... | Rare. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn.m.,s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E... | 193 | 53.3 | fne.s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5565... | 5 51 42 N.; 120 30 30 E... | 243 | 52.3 | s.,ptr.,sh... | Rare. |
| | | | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Few. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn.m........ | Few. |

**SIPHOGENERINA RAPHANUS (Parker and Jones), var. COSTULATA Cushman.**

Plate 56, fig. 6.

*Siphogenerina raphanus* (PARKER and JONES), var. *costulata* CUSHMAN, Proc U. S. Nat. Mus., vol. 51, 1917, p. 662.

This variety differs from the typical in its much more cylindrical form, its few very definite costae, and the very short, wide neck without a lip. This variety does not always occur with the typical, but in all the material seen there appear to be no intermediate forms. Both microspheric and megalospheric forms were noted. The variety occurred at the following stations: From the exterior of pearl oyster, Jolo Jolo; D5134, Sulu Archipelago, near Basilan Island, 25 fathoms (46 meters); D5201, Sogod Bay, southern Leyte, 554 fathoms (1,012 meters), bottom temperature 52.8° F. (11.5° C.); D5575, north of Tawi Tawi, 315 fathoms, bottom temperature 52.3° F.; D5142, vicinity of Jolo, 21 fathoms (39 meters); D5143, vicinity of Jolo, 19 fathoms (35 meters); D5469, east coast of Luzon, San Bernardino Strait to San Miguel Bay, 500 fathoms (914 meters); D5546, Jolo Island and vicinity, 138 fathoms (252 meters), bottom temperature

58.3° F. (14.6° C.); D5572, north of Tawi Tawi, 334 fathoms (61 meters), bottom temperature 52.3° F. (11.2° C.); D5580, vicinity o Darvel Bay, Borneo, 162 fathoms (297 meters), bottom temperatur 55.8° F. (13.2° C.); D5636, Pitt Passage, 1,262 fathoms (2,30 meters).

*Siphogenerina raphanus*, var. *costulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13132 | U.S.N.M. | 1 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne.s........ | Rare. |
| 9145 | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co.s......... | Rare. |
| | | | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co.s.,sh..... | |
| 13130 | U.S.N.M. | 5 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Few. |
| 13131 | U.S.N.M. | 7 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn.m........ | Few. |
| | | | D5546... | 6 06 48 N.; 121 20 32 E... | 138 | 58.3 | fne.s........ | |
| 13129 | U.S.N.M. | 4 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Few. |
| | | | D5575... | 5 28 30 N.; 120 02 27 E... | 315 | 52.3 | Co., s....... | |
| | | | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | |
| 14947 | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 12 30 E... | 1,262 | ....... | gy.m.,fne.s. | Rare. |
| | | | | Exterior pearl oyster, Jolo Jolo, P. I. | ....... | ....... | ............. | |

## Subfamily RAMULININAE.

### Genus RAMULINA Rupert-Jones, 1875.

### RAMULINA GLOBULIFERA H. B. Brady.

*Ramulina globulifera* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 5 pl. 8, figs. 32, 33; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 587, pl. 7 figs. 22-28.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 321, pl. 68, fig. 6. CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 3, 1913, p. 110, pl. 39, fig. 1.

Brady recorded this species from a single *Challenger* station o the Philippines in 95 fathoms (174 meters). At *Albatross* statio D5259, off northwestern Panay, in 312 fathoms (571 meters), botto temperature 49.3° F. (9.6° C.), this species was abundant. The onl other record of its occurrence in the region is D5537, in 254 fathom (465 meters), between Negros and Siquijor, bottom temperatu 53.5° F. (11.8° C.).

*Ramulina globulifera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12757 | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy.m.,glob.. | Common. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn.m........ | |

## Family CHILOSTOMELLIDAE.

### Genus CHILOSTOMELLA Reuss, 1850.

### CHILOSTOMELLA OVOIDEA Reuss.

*Chilostomella ovoidea* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 380, pl. 48, fig. 12.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 436, pl. 55, figs. 12–23.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 2, pl. 1, figs. 1–5.

Although never noted in any considerable numbers, this species occurred at numerous stations, mostly within the Philippine Archipelago, as follows: China Sea, off southern Luzon; Tanon Strait, east coast of Negros; Sogod Bay, southern Leyte; east of Masbate Island; between Burias and Luzon; Palawan Passage; Dupon Bay, Leyte; between Cebu and Bohol; and Macassar Strait.

Bottom temperatures where given range from 44° F. to 59° F. (6.6° C. to 15° C.), with the average of 52.9° F. (11.6° C.). Depths range from 127 to 1,008 fathoms (233 to 1,844 meters), but two stations being over 375 fathoms (686 meters); one of 554 fathoms (1,012 meters), the other 1,008 fathoms (1,844 meters).

The specimens were of the typical form, ovoid in side view and the test pellucid.

Length up to 1 mm.

*Chilostomella ovoidea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 25 E... | 177 | 52.4 | dk. gn. m... | Rare. |
| 13374 | U.S.N.M. | 1 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Rare. |
| 13377 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Few. |
| 14067<br>12840<br>12845 | U.S.N.M. | 1<br>5 | D5211... | 11 51 35 N.; 124 14 00 E... | 155 | 56.6 | gn. m., s.... | Few. |
| 13375 | U.S.N.M. | 1 | D5216... | 12 52 00 N.; 123 23 30 E... | 215 | 51.9 | gn. m....... | Few. |
| 12841 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 15 E... | 195 | 52.8 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 13379 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s.... | Rare. |
| 13376 | U.S.N.M. | 1 | D5404... | 10 50 00 N.; 124 26 18 E.. | 190 | 55.4 | m........... | Rare. |
| 13378 | U.S.N.M. | 1 | D5420... | 9 49 35 N.; 123 45 00 E... | 127 | 59.0 | ............. | Rare. |
| 12842 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 22 E... | 138 | 58.3 | fne. co. s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Rare. |
| 12843 | U.S.N.M. | 1 | D5665... | 4 27 00 S.; 118 44 00 E.. | 1,008 | ....... | m........... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Rare. |

### CHILOSTOMELLA GRANDIS Cushman.

Plate 57, figs. 5*a*–*c*.

*Chilostomella grandis* Cushman, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 662.

*Description.*—Test broadly elliptical in side view; in end view circular; two chambers visible from the exterior; wall thick and opaque, smooth; aperture in end view semicircular with a flange-like truncated lip.

Length up to 4 mm. and more.

*Distribution.*—Type-specimens (U.S.N.M. No. 9146) from *Albatross* station D5449, in 300 fathoms (549 meters), east coast of Luzon between San Bernardino Strait and San Miguel Bay. It also occurred at D5469, in 500 fathoms (914 meters), in the same region; D5300, in 265 fathoms (485 meters), China Sea, vicinity of southern Luzon; and D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.).

This species is nearly four times the size of typical *Chilostomella ovoidea*, and differs in the broadly elliptical outline of the side view, the very thick, opaque test, and in the appearance of the lip, which in direct side view is practically a straight line, while in typical *C. ovoidea* it is usually a depressed curve.

*Chilostomella grandis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12844 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| 12846 | U.S.N.M. | 2 | D5300... | 20 31 00 N.; 115 49 00 E... | 265 | ....... | gy. m., s.... | Rare. |
| 9146 | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E... | 300 | ....... | ............... | Rare. |
| 14371 | U.S.N.M. | 3 | | | | | | |
| 12847 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | Rare. |

## Genus ALLOMORPHINA Reuss, 1850.

### ALLOMORPHINA TRIGONA Reuss.

*Allomorphina trigona* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1850, p. 380, pl. 48, figs. 14*a*–*e*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 438, pl. 55, figs. 24–26.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 3, pl. 1, figs. 6–8.

Typical material of this species has occurred at the following six stations: D5112, in 177 fathoms (324 meters), China Sea off southern Luzon, bottom temperature 52.4° F. (11.3° C.); D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte, bottom temperature 52.8° F. (11.5° C.); D5467, in 480 fathoms (878 meters), east coast of Luzon, between San Bernardino Strait and San Miguel Bay; D5529, in 441 fathoms (812 meters), between Siquijor and Bohol Islands, bottom temperature 53° F. (11.7° C.); D5625, in 230 fathoms (420 meters), between Gillolo and Kayoa Islands; and D5654, in 805 fathoms (1,472 meters), Gulf of Boni.

Scattered specimens seem to be the rule as far as material from these stations show.

*Allomorphina trigona*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5625... | 0 07 00 N.; 127 29 00 E.. | 230 | ....... | gy. m., fne. s. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E.. | 805 | ....... | .............. | Rare. |

## Family GLOBIGERINIDAE.

### Genus GLOBIGERINA d'Orbigny, 1826.

### GLOBIGERINA BULLOIDES d'Orbigny.

*Globigerina bulloides* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 277, No. 1; Modèles, 1826, No. 17 and No. 76.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 593, pl. 77; pl. 79, figs. 3–7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 5, pl. 2, figs. 7–9; pl. 9.

This species was found at 34 stations in the area, some of them in the protected waters of the Archipelago. It was frequent in the China Sea and occasional in the Sulu Sea; Gulf of Tomini, Celebes; between Gillolo and Makyan Islands, and between Gillolo and Kayao Islands; and rare at a few points in protected waters of the Archipelago, being noted as frequent at one station off Masbate. These stations range in depth from 10 to 765 fathoms (18 to 1,399 meters), the average depth being 247 fathoms (452 meters), and the bottom temperature ranges from 40.6° F. to 63.6° F (4.7° C. to 17.5° C.), with the average 52.7° F. (11.4° C.).

The distribution of this and various other species of the family seems to be due very largely to ocean currents. The current from the east flows against the eastern side of the islands, then turns and is swept back again. The currents undoubtedly carry some species into the waters of the Archipelago, but in comparatively few numbers, and the only stations at which they are found in any quantity are on the eastern coasts of Luzon and Mindanao. The southern current sweeping into the China Sea also carries certain species into that region also.

*Globigerina bulloides*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s., sh. | Few. |
| | | | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m........ | Few. |
| | | | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | co............ | Few. |
| | | | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Few. |
| | | | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m... | Few. |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Frequent. |
| | | | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Few. |
| | | | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh..... | Few. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Few. |
| 12524 | U.S.N.M. | 5 | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s.... | Few. |
| 12494 | U.S.N.M. | 8 | D5213... | 12 15 00 N.; 123 57 30 E.. | 80 | ....... | s., m., sh.... | Common. |
| | | | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Few. |
| | | | D5216... | 12 52 00 N.; 123 23 30 E.. | 215 | 50.2 | gn. m....... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Frequent. |
| | | | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Few. |
| | | | D5243... | 6 50 55 N.; 126 14 35 E.. | 218 | 63.6 | gy. m....... | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Few. |
| | | | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s......... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ....... | co. s......... | Few. |
| 12522 | U.S.N.M. | 6 | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh.... | Few. |
| | | | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m....... | Few. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Few. |
| | | | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy. m., fne. s. | Few. |
| | | | D5542... | 8 48 30 N.; 123 35 30 E.. | 200 | 54.3 | fne. s., brk. sh | Few. |
| | | | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............. | Few. |
| | | | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 58.3 | fne. co. s.... | Few. |
| | | | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for. | Few. |
| | | | D5551... | 5 54 48 N.; 120 44 24 E.. | 192 | 53.3 | fne. s........ | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............. | Few. |
| | | | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s., glob., ptr. | Few. |
| | | | D5621... | 0 15 00 N.; 127 24 35 E.. | 296 | ....... | gy. bk. s.... | Few. |
| | | | D5623... | 0 16 30 N.; 127 30 00 E.. | 272 | ....... | fne. s., m.... | Few. |
| | | | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s | Few. |
| | | | D5626... | 0 07 30 N.; 127 29 00 E.. | 265 | ....... | gy. m., fne. s | Few. |

### GLOBIGERINA BULLOIDES d'Orbigny, var. TRILOBA Reuss.

*Globigerina triloba* Reuss, Denkschr. Acad. Wiss. Wien, vol. 1, 1850, p. 374, pl. 47, fig. 11.

*Globigerina bulloides* d'Orbigny, var. *triloba* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 595, pl. 79, figs. 1, 2; pl. 81, figs. 2, 3.

*Description.*—Variety, with the three last-formed chambers making up the entire visible test.

*Distribution.*—This variety seems to be very rare in the region, occurring at *Albatross* station D5445, in 383 fathoms (699 meters) east coast of Luzon, bottom temperature 44.3° F. (6.8° C.); D5636 in 1,262 fathoms (2,309 meters), Pitt Passage; and D5638, the neighboring station, 517 fathoms (946 meters).

*Globigerina bulloides*, var. *triloba*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | |
| 12525 | U.S.N.M. | ...... | D5636... | 10 55 00 S.; 127 42 30 E.. | 1,262 | ....... | gy. m., fne. s. | Rare. |
| 12526 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s..... | Rare. |

### GLOBIGERINA CRETACEA d'Orbigny.

*Globigerina cretacea* D'ORBIGNY, Mém. Soc. Géol. France, ser. 1, vol. 4, 1840, p. 34, pl. 3, figs. 12-14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 596, pl. 82, figs. 10*a*-*c* (?).—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 7.

A form, which it does not seem clear whether to place under this species or under *G. dubia* Egger, is not uncommon in the outside waters: China Sea; Flores Sea; Macassar Strait; Gulf of Tomini, Celebes; off Bouro Island; off Gillolo, etc.; and at numerous stations in the protected waters of the Archipelago. These range in depth from 24 to 1,570 fathoms (44 to 2,871 meters), with the average depth 320 fathoms (586 meters); the bottom temperatures ranging from 39.2° to 63.6° F. (4.0° C. to 17.5° C.), with the average 51.2° F. (10.6° C.).

*Globigerina cretacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s., sh. | Few. |
| | | | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s., sh. | Rare. |
| | | | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m....... | Few. |
| | | | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | ....... | dk. gn. m.... | Common. |
| | | | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m.... | Frequent. |
| | | | D5114... | 13 36 11 N.; 120 45 26 E.. | 340 | ....... | fne. s........ | Frequent. |
| | | | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ....... | ............... | Few. |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Few. |
| | | | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Few. |
| | | | D5146... | 6 04 30 N.; 120 59 30 E.. | 24 | ....... | co. s., sh..... | Few. |
| | | | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Common. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh..... | Few. |
| [illegible] | U.S.N.M. | 10 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Frequent. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E.. | 668 | 49.8 | gn. m......... | Few. |
| | | | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft. gn. m.... | Few. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E.. | 82 | ....... | gn. s......... | Frequent. |
| | | | D5203... | 9 58 00 N.; 125 07 40 E.. | 775 | 52.9 | gn. m......... | Frequent. |
| | | | D5206... | 11 31 40 N.; 124 42 40 E.. | 82 | ....... | gn. m......... | Frequent. |
| | | | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m.... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s..... | Few. |
| | | | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m......... | Few. |
| [illegible] | U.S.N.M. | 10 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m......... | Frequent. |
| | | | D5248... | 6 50 55 N.; 126 14 35 E.. | 218 | 63.6 | gy. m......... | Few. |
| | | | D5247... | 7 02 00 N.; 125 38 45 E.. | 135 | ....... | m. s.......... | Rare. |
| [illegible] | U.S.N.M. | 8 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Frequent. |
| | | | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s..... | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s. m.......... | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s. p.......... | Frequent. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | Few. |
| | | | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Few. |
| | | | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Few. |
| | | | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............. | Frequent. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Few. |
| | | | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s......... | Few. |
| | | | D5364... | 13 48 30 N.; 120 43 45 E.. | 106 | ....... | bk. s......... | Rare. |
| | | | D5377... | 13 26 00 N.; 122 19 00 E.. | 400 | 49.6 | sft. gn. m.... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ....... | co. s......... | Few. |
| [illegible] | U.S.N.M. | 10 | D5430... | 9 49 40 N.; 119 03 20 E.. | 464 | 50.0 | glob. oz..... | Frequent. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s..... | Few. |
| | | | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ....... | s., sh., g..... | Few. |
| | | | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy. m., fne. s. | Few. |
| [illegible] | U.S.N.M. | 6 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Few. |
| | | | D5542... | 8 48 30 N.; 120 35 30 E.. | 200 | 54.3 | fne. s., brk. sh. | Few. |
| | | | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s............. | Few. |
| | | | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk. sh... | Rare. |
| | | | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for.. | Few. |
| | | | D5551... | 5 54 48 N.; 120 44 24 E.. | 193 | 53.3 | fne. s........ | Few. |
| | | | D5565... | 5 51 42 N.; 120 30 30 E.. | 243 | 52.3 | s., ptr. sh.... | Few. |

*Globigerina cretacea—Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5571... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.3 | s., sh........ | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Rare. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Few. |
| | | | D5601... | 1 13 10 N.; 125 17 05 E.. | 765 | ....... | s., glob., ptr. | Few. |
| | | | D5622... | 0 19 20 N.; 127 28 30 E.. | 275 | ....... | gy. m........ | Few. |
| | | | D5623... | 0 16 30 N.; 127 30 00 E.. | 272 | ....... | fne. s., m.... | Few. |
| | | | D5625... | 0 07 00 N.; 127 28 00 E.. | 230 | ....... | gy. m., fne. s. | Frequent. |
| | | | D5626... | 0 07 30 N.; 127 29 00 E.. | 265 | ....... | gy. m., fne. s. | Few. |
| | | | D5637... | 3 53 20 S.; 125 48 00 E.. | 700 | ....... | gy. m........ | Few. |
| 14374 | U.S.N.M. | 4 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Frequent. |
| | | | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | Few. |
| | | | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy. m., s.... | Few. |
| | | | D5665... | 4 27 00 S.; 118 44 00 E.. | 1,008 | ....... | m............ | Few. |
| 14375 | U.S.N.M. | 3 | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy. m........ | Common. |

### GLOBIGERINA DIGITATA H. B. Brady.

*Globigerina digitata* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 72; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 599, pl. 80, figs. 6-10; pl. 82, figs. 6, 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 7, pl. 14, figs. 1-3.

Specimens of this interesting species have been found in few numbers from 14 *Albatross* stations in the region. These are in the Sulu Sea; between Panay and Negros; Tanon Strait, east coast of Negros; Gulf of Davao; off northwestern Panay; China Sea, off southern Luzon; Palawan Passage; off Jolo Island; and Flores Sea.

These stations range in depth from 135 to 885 fathoms (247 to 1,618 meters), the average depth being 495 fathoms (905 meters); bottom temperatures range from 38.2° to 62.8° F. (3.4° to 17.1° C.), average 47.5° F. (8.6° C.).

In Palawan Passage specimens at one station were common, but usually they were represented at any one station by very few specimens. At one station in Flores Sea specimens were found with the chambers branched at the tips.

*Globigerina digitata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12515 | U.S.N.M. | 1 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Rare. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E.. | 688 | 49.8 | gn. m........ | Few. |
| 14382 | U.S.N.M. | 1 | D5191... | 10 29 45 N.; 123 31 15 E.. | 258 | 62.8 | gn. m........ | Few. |
| 12514 | U.S.N.M. | 1 | D5247... | 07 02 00 N.; 126 38 45 E.. | 135 | ....... | m............ | Rare. |
| 14380 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| 12513 | U.S.N.M. | 2 | D5284... | 13 42 06 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Few. |
| 12507<br>12512 | U.S.N.M. | 2 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Few. |
| 12508 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s........ | Few. |
| 12509 | U.S.N.M. | 10 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s........ | Common. |
| 12511 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Rare. |
| | | | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for.. | Rare. |
| 14381 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | Rare. |
| 12510 | U.S.N.M. | 4 | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | 39.2 | gy. m., s.... | Few. |
| 14903 | U.S.N.M. | 2 | H4937... | 5 32 50 N.; 120 49 10 E.. | 885 | 38.2 | gy. m........ | Few. |

### GLOBIGERINA INFLATA d'Orbigny.

*Globigerina inflata* D'ORBIGNY, in Baker, Webb and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, 1839, "Foraminifères," p. 134, pl. 2, figs. 7–9.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 601, pl. 79, figs. 8–10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 8, pl. 4, figs. 4–8.

At eight stations specimens of this species occurred as follows: *batross* D5126, Sulu Sea, southern Panay, 742 fathoms (1,357 meters) tom temperature 49.5° F. (9.8° C.); D5201, in 554 fathoms (1,012 ers), Sogod Bay, southern Leyte, bottom temperature 52.8° F. 5° C.); D5152, in 34 fathoms (62 meters), Sulu Archipelago, i Tawi Group; D5178, in 78 fathoms (143 meters), off Romblon; 211, east of Masbate Island, 155 fathoms (283 meters), bottom perature 56.6° F. (13.6° C.); D5236, in 494 fathoms (903 meters), ific Ocean, east coast of Mindanao, bottom temperature 41.2° F. 1° C.); and D5369, in 106 fathoms (194 meters), off Marinduque nd, and D5618, Molucca Passage, 417 fathoms (763 meters).

*Globigerina inflata—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Rare. |
| U.S.N.M. | 8 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Frequent. |
| U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| U.S.N.M. | 5 | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s..... | Few. |
| | | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s., m.... | |
| | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | |
| | | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ....... | bk. s........ | |
| U.S.N.M. | 7 | D5618... | 00 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m........ | Frequent. |

### GLOBIGERINA RUBRA d'Orbigny.

*Globigerina rubra* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839; "Foraminifères," p. 94, pl. 4, figs. 12–14.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 602, pl. 79, figs. 11–16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 9, pl. 3, figs. 6–9.

pecimens of this species occurred at several stations in the area: northern Cebu; east of Masbate; off southeastern Mindoro; Verde nd Passage; Palawan Passage; Ragay Gulf; east coast of Luzon; off Jolo Island.

hese stations vary in depth from 32 to 730 fathoms (59 to 1,335 ers) with the average depth 237 fathoms (434 meters). Bottom peratures from 40.6° F. to 56.6° F. (4.7° C. to 13.6° C.).

ew specimens showed the reddish color, but had the characteric form of the species.

*Globigerina rubra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12517 | U.S.N.M. | 1 | D5192... | 11 00 15 N.; 123 50 00 E.. | 32 | ........ | gn. s......... | Few. |
| | | | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s.... | Few. |
| 12520 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ........ | s., m......... | Rare. |
| 12516 | U.S.N.M. | 1 | D5267... | 13 42 20 N.; 120 58 25 E.. | 170 | ........ | p., s., sh.... | Rare. |
| | | | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s......... | Rare. |
| 12518 | U.S.N.M | 1 | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ........ | co. s......... | Few. |
| 12519 | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 59 E.. | 358 | 44.3 | gn. m., s.... | Rare. |
| 12521 | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E.. | 193 | 53.3 | fne. s........ | Rare. |

GLOBIGERINA CONGLOBATA H. B. Brady.

*Globigerina conglobata* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, *1879*, p, 72; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 603, pl. 80, figs. 1-5; pl. 82. fig. 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 10, pl. 3, figs. 3-5; pl. 10, figs. 1, 6.

At 58 stations record was made of this species in my examination of the material. These are very largely in the China Sea; the east coasts of Luzon and Mindanao; off Jolo and Tawi Tawi; Darvel Bay, Borneo; Gulf of Tomimi, Celebes; between Gillolo and Makayan; off Bouro Island; Molucca Sea; Gulf of Boni; Flores Sea with scattered stations in the protected waters of the Archipelago.

The stations range in depth from 18 to 1,570 fathoms (33 to 2,87 meters), the average depth being 324 fathoms (593 meters); th average bottom temperature, 50.5° F. (10.2° C.).

*Globigerina conglobata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5109... | 14 17 15 N.; 120 52 30 E.. | 35 | ........ | gy. s......... | Few. |
| 12600 | U.S.N.M. | 5 | D5110... | 13 50 20 N.; 120 75 45 E.. | 135 | 50 | dk. gy. m.... | Few. |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 383 | 42.7 | gn. m., s..... | Few. |
| | | | D5121... | 13 27 20 N.; 121 17 45 E.. | 106 | ........ | dk. gn. m..... | Few. |
| | | | D5152... | 5 22 55 N.; 120 15 45 E.. | 24 | ........ | co. s., sh..... | Frequent. |
| | | | D5153... | 5 13 10 N.; 120 02 55 E.. | 40 | ........ | co. s., sh..... | Few. |
| | | | D5156... | 5 12 50 N.; 119 55 55 E.. | 18 | ........ | fne. s., sh.... | Rare. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ........ | fne. s., sh.... | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ........ | fne. s......... | Few. |
| | | | D5185... | 10 06 45 N.; 122 18 30 E.. | 628 | 49.8 | gn. m......... | Few. |
| | | | D5192... | 11 00 15 N.; 123 50 00 E.. | 32 | ........ | gn. s......... | Few. |
| | | | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Frequent. |
| | | | D5227... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| | | | D5220... | 13 36 00 N.; 121 55 00 E.. | 50 | ........ | sft. gn. m.... | Frequent. |
| 12698 | U.S.N.M. | 10+ | D5229... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| | | | D5247... | 7 02 00 N.; 125 38 45 E.. | 135 | ........ | m............. | Few. |
| | | | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ........ | sft........... | Few. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| | | | D5267... | 13 42 20 N.; 120 58 25 E.. | 170 | ........ | p., s., sh.... | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ........ | s., p......... | Few. |

*Globigerina conglobata*—*Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5300 | 20 31 00 N.; 115 40 00 E. | 265 | ....... | gy. m., s. | Few. |
| | | | D5301 | 20 37 00 N.; 115 43 00 E. | 206 | 50.5 | gy. m., s. | Rare. |
| | | | D5311 | 21 33 00 N.; 116 15 00 E. | 88 | ....... | crs. s., sh. | Rare. |
| | U.S.N.M. | 4 | D5313 | 21 30 00 N.; 116 43 00 E. | 180 | 53.6 | s. | Few. |
| | | | D5315 | 21 40 00 N.; 116 58 00 E. | 148 | 54.4 | s., sh. | Few. |
| | | | D5338 | 11 33 45 N.; 119 24 45 E. | 43 | ....... | co. s., m. | Few. |
| | | | D5342 | 10 56 55 N.; 119 17 24 E. | 145 | ....... | gy. m. | Rare. |
| | | | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co. s. | Few. |
| | | | D5349 | 10 54 00 N.; 118 26 20 E. | 730 | 40.6 | co. s. | Few. |
| | | | D5370 | 13 44 15 N.; 121 42 30 E. | 159 | 54.3 | sft. m. | Few. |
| | | | D5381 | 13 14 15 N.; 122 44 25 E. | 88 | ....... | co. s. | Few. |
| | | | D5443 | 12 43 05 N.; 125 01 00 E. | 241 | 51.3 | co. s., sh. | Rare. |
| | | | D5445 | 12 44 42 N.; 124 59 50 E. | 381 | 44.3 | gn. m., s. | Few. |
| | U.S.N.M. | 2 | D5446 | 12 43 51 N.; 124 59 18 E. | 300 | ....... | gn. m. | Few. |
| | | | D5449 | 13 21 36 N.; 124 00 30 E. | 300 | ....... | ............ | Few. |
| | | | D5459 | 13 10 21 N.; 123 59 54 E. | 201 | ....... | ............ | Rare. |
| | | | D5467 | 13 35 27 N.; 123 37 18 E. | 480 | ....... | gy. m. | Few. |
| | | | D5470 | 13 37 30 N.; 123 41 09 E. | 500 | ....... | m. | Rare. |
| | | | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | ....... | s., sh., g. | Few. |
| | | | D5512 | 8 16 02 N.; 123 58 26 E. | 445 | 52.8 | gy. m., fne. s. | Few. |
| | | | D5529 | 9 23 45 N.; 123 39 30 E. | 441 | 53 | gy. m., glob. | Few. |
| | | | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.3 | gn. m., s. | Few. |
| | | | D5542 | 8 48 30 N.; 123 35 30 E. | 200 | 54.3 | fne. s., brk. sh. | Few. |
| | | | D5543 | 8 47 15 N.; 123 35 00 E. | 162 | 54.5 | s. | Few. |
| | | | D5548 | 6 00 20 N.; 120 45 35 E. | 232 | 53.5 | s., brk. sh. | Few. |
| | | | D5548 | 6 01 15 N.; 120 44 20 E. | 263 | 52.3 | s., glob., for. | Few. |
| | | | D5571 | 5 30 45 N.; 120 07 57 E. | 340 | 52.3 | s., sh. | Few. |
| | | | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | br. s., co. | Rare. |
| | | | D5612 | 0 38 00 S.; 121 45 40 E. | 750 | ....... | ............ | Few. |
| | | | D5621 | 0 15 00 N., 127 24 45 E. | 298 | ....... | gy., bk. s. | Few. |
| | | | D5627 | 0 06 00 N.; 127 26 00 E. | 22 | ....... | m. | Few. |
| | | | D5630 | 0 56 30 S.; 128 06 00 E. | 569 | ....... | co. s., m. | Rare. |
| | | | D5637 | 3 53 20 S.; 126 48 00 E. | 700 | ....... | gy. m. | Few. |
| | | | D5639 | 3 54 50 S.; 123 27 20 E. | 1,500 | ....... | gy. m. | Few. |
| | | | D5650 | 4 53 45 S.; 121 39 00 E. | 540 | 40.1 | gn. m. | Few. |
| | | | D5660 | 5 36 30 S.; 120 49 00 E. | 692 | 39.2 | gy. m., s. | Few. |
| | | | H4897 | 7 46 00 N.; 122 00 00 E. | 1,570 | ....... | gy. m., glob. | Few. |
| | U.S.N.M. | 1 | H4987 | 5 32 50 N.; 120 49 10 E. | 885 | 38.2 | gy. m. | Few. |
| | U.S.N.M. | 1 | Nero 849. | 15 16 00 N.; 121 40 00 E. | 787 | ....... | gn. m. | Rare. |

### GLOBIGERINA SACCULIFERA H. B. Brady.

*Globigerina helicina* CARPENTER (not *G. helicina* d'Orbigny), Introd. Foram., 1862, pl. 12, fig. 11.

*Globigerina sacculifera* H. B. BRADY, Geol. Mag., Dec. 2, vol. 4, 1877, p. 535; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 604, pl. 80, figs. 11–17; pl. 82, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 11, pl. 2, figs. 4–6; pl. 5, pl. 10, fig. 4.

I have noted the occurrence of this species in material from nearly a hundred stations in the area. These stations cover practically the entire area which was worked over by the *Albatross* in this area. They range in depth from 20 to 1,570 fathoms (37 to 2,871 meters); average depth, 286 fathoms (523 meters). The average bottom temperature is 53.3° F. (11.8° C.).

As a rule specimens were most common in the areas already mentioned for other specimens.

### *Globigerina sacculifera*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5096 | 14 20 23 N.; 120 34 15 E. | 28 | ........ | gy.m., s., sh. | Few. |
| | | | D5097 | 14 19 15 N.; 120 33 52 E. | 30 | ........ | gy.m., s., sh. | Rare. |
| 12502 | U.S.N.M. | 10+ | D5100 | 14 17 15 N.; 120 33 40 E. | 35 | ........ | gy.s. | Common. |
| | | | D5106 | 14 23 55 N.; 120 32 33 E. | 37 | ........ | gy.m. | Few. |
| 12504 | U.S.N.M. | 10 | D5110 | 13 50 20 N.; 120 75 45 E. | 135 | 59.0 | dk.gy.m. | Common. |
| | | | D5112 | 13 48 22 N.; 120 47 25 E. | 177 | 52.4 | dk.gn.m. | Frequent. |
| | | | D5113 | 13 51 30 N.; 120 50 30 E. | 159 | ........ | dk.gn.m. | Few. |
| | | | D5114 | 13 36 11 N.; 120 45 26 E. | 340 | ........ | fne.s. | Frequent. |
| | | | D5115 | 13 37 11 N.; 120 43 40 E. | 340 | ........ | ........ | Frequent. |
| | | | D5120 | 13 45 30 N.; 120 30 15 E. | 393 | 43.7 | gn.m., s. | Few. |
| | | | D5121 | 13 27 20 N.; 121 17 45 E. | 108 | ........ | dk.gn.m. | |
| | | | D5126 | 10 34 45 N.; 121 47 30 E. | 742 | 49.5 | sft.gn.m. | Few. |
| | | | D5146 | 5 46 40 N.; 120 48 50 E. | 24 | ........ | co.s., sh. | Few. |
| | | | D5152 | 5 23 55 N.; 120 15 45 E. | 24 | ........ | co.s., sh. | Frequent. |
| | | | D5153 | 5 18 10 N.; 120 02 55 E. | 49 | ........ | co.s., sh. | Few. |
| | | | D5172 | 6 03 15 N.; 120 35 30 E. | 318 | ........ | fne.s., sh. | Common. |
| | | | D5178 | 12 43 00 N.; 122 06 15 E. | 78 | ........ | fne.s. | Common. |
| | | | D5179 | 12 33 15 N.; 122 12 30 E. | 37 | 75.7 | hrd. s. | Few. |
| | | | D5185 | 10 05 45 N.; 122 18 30 E. | 688 | 49.8 | gn.m. | Frequent. |
| | | | D5189 | 9 56 30 N.; 123 15 00 E. | 300 | 62.8 | gn.m. | Few. |
| 12505 | U.S.N.M. | 10 | D5191 | 10 29 45 N.; 123 21 15 E. | 258 | 62.8 | gn.m. | Common. |
| | | | D5192 | 11 09 15 N.; 123 50 00 E. | 32 | ........ | gn.s. | Few |
| | | | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy.s., m. | Frequent. |
| | | | D5206 | 11 31 40 N.; 124 43 40 E. | 32 | ........ | gn.m. | Few. |
| | | | D5211 | 11 51 35 N.; 124 14 00 E. | 155 | 56.6 | gn.m., s. | Frequent. |
| | | | D5212 | 12 04 15 N.; 124 04 36 E. | 108 | 59.9 | gy.s., m. | Few. |
| | | | D5215 | 12 31 30 N.; 123 35 24 E. | 604 | 50.5 | gn.m. | Few. |
| | | | D5216 | 12 52 00 N.; 123 23 30 E. | 200 | 50.2 | ........ | Frequent. |
| | | | D5217 | 13 20 00 N.; 123 14 15 E. | 105 | 63.1 | crs.gy.s. | Frequent. |
| | | | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | ........ | crs.s. | Few. |
| | | | D5219 | 13 21 00 N.; 122 18 45 E. | 530 | 50.8 | gn.m. | Few. |
| | | | D5220 | 13 38 00 N.; 121 58 00 E. | 50 | ........ | sft.gn.m. | Frequent. |
| | | | D5222 | 13 38 30 N.; 121 42 45 E. | 195 | 52.8 | gn.m. | Few. |
| 12508 | U.S.N.M. | | D5236 | 8 50 45 N.; 123 26 52 E. | 494 | 41.2 | fne.gy.s. | Few. |
| | | | D5241 | 6 50 45 N.; 123 14 38 E. | 215 | ........ | sft.gy.m. | Few. |
| | | | D5243 | 6 50 55 N.; 123 14 35 E. | 218 | 63.6 | gy.m. | Common. |
| | | | D5247 | 7 02 00 N.; 125 38 45 E. | 135 | ........ | m. | Few. |
| | | | D5257 | 7 22 12 N.; 124 12 15 E. | 28 | ........ | m. | Few. |
| | | | D5259 | 11 57 30 N.; 121 42 15 E. | 312 | 49.3 | gy. m., glob. | Common. |
| | | | D5260 | 12 26 35 N.; 121 31 35 E. | 224 | 51.4 | gn.m., s. | Few. |
| | | | D5261 | 12 30 55 N.; 121 34 24 E. | 145 | ........ | s., m. | Few. |
| | | | D5267 | 13 42 20 N.; 120 58 26 E. | 170 | ........ | p., s., sh. | Few. |
| | | | D5268 | 13 42 00 N.; 120 57 15 E. | 170 | ........ | s. p. | Common. |
| | | | D5277 | 13 56 55 N.; 120 13 45 E. | 80 | 58.6 | fne.s. | Few. |
| | | | D5281 | 13 52 45 N.; 120 26 00 E. | 201 | 50.4 | dk. gy. s. | Few. |
| | | | D5282 | 13 53 00 N.; 120 26 45 E. | 248 | 47.4 | dk. gy. s. | Frequent. |
| | | | D5291 | 13 29 40 N.; 121 00 45 E. | 173 | 51.5 | fne. bk. s. | Frequent. |
| | | | D5300 | 20 31 00 N.; 115 49 00 E. | 265 | ........ | gy.m., s. | Few. |
| | | | D5313 | 21 30 00 N.; 116 43 00 E. | 150 | 53.6 | s. | Few. |
| | | | D5315 | 21 40 00 N.; 116 58 00 E. | 148 | 54.4 | s., sh. | Few. |
| 13107 | U.S.N.M. | 5 | D5338 | 11 33 45 N.; 119 26 00 E. | 43 | ........ | co.s., m. | Few. |
| | | | D5342 | 10 56 55 N.; 119 17 24 E. | 145 | ........ | gy.m. | Rare. |
| | | | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co.s. | Common. |
| 12670 | U.S.N.M. | 10 | D5349 | 10 54 00 N.; 118 26 20 E. | 730 | 40.6 | co.s. | Common. |
| | | | D5370 | 13 44 15 N.; 121 42 30 E. | 159 | 54.3 | sft.m. | Few. |
| | | | D5374 | 13 46 45 N.; 121 35 08 E. | 190 | ........ | gy.m. | Common. |
| | | | D5381 | 13 14 15 N.; 122 44 25 E. | 88 | ........ | co.s. | Few. |
| | | | D5394 | 12 00 30 N.; 124 05 36 E. | 153 | ........ | gn.m. | Few. |
| | | | D5428 | 9 13 00 N.; 118 51 15 E. | 1,105 | 49.4 | gy.m. | Few. |
| | | | D5430 | 9 49 40 N.; 119 03 30 E. | 464 | 50.0 | glob. oz. | Rare. |
| | | | D5449 | 13 21 36 N.; 124 00 30 E. | 300 | ........ | ........ | Few. |
| | | | D5467 | 13 35 27 N.; 123 37 18 E. | 480 | ........ | gy.m. | Few. |
| | | | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | ........ | s., sh., g. | Few. |
| | | | D5512 | 8 16 02 N.; 123 58 26 E. | 445 | 52.8 | gy.m., fne.s. | Few. |
| | | | D5526 | 9 12 45 N.; 123 45 30 E. | 806 | 52.3 | gn.m., glob. | Frequent. |
| | | | D5529 | 9 23 45 N.; 123 39 30 E. | 441 | 53.0 | gy.m., glob. | Few. |
| | | | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.3 | gn.m., s. | Common. |
| | | | D5546 | 6 06 48 N.; 121 20 32 E. | 128 | 56.3 | fne.co.s. | Few. |
| | | | D5549 | 6 01 15 N.; 120 44 20 E. | 263 | 52.3 | s., glob., for. | Few. |
| | | | D5571 | 5 30 45 N.; 120 07 57 E. | 340 | 52.3 | s., sh. | Few. |
| | | | D5576 | 5 25 56 N.; 120 03 30 E. | 277 | 53.3 | s. | Few. |
| | | | D5579 | 4 54 15 N.; 109 09 52 E. | 175 | 55.3 | fne. s., Co. | Rare. |
| | | | D5601 | 1 03 10 N.; 125 17 05 E. | 765 | ........ | s. glob., ptr. | Few. |
| | | | D5618 | 0 37 00 N.; 127 15 00 E. | 417 | ........ | gy.m. | Few. |
| | | | D5625 | 0 07 00 N.; 127 28 00 E. | 230 | ........ | gy.m., fne.s. | Few. |
| | | | D5627 | 0 06 00 N.; 127 26 00 E. | 22 | ........ | m. | Few. |
| 12506 | U.S.N.M. | 1 | D5630 | 0 56 30 S.; 128 05 00 E. | 569 | ........ | co.s., m. | Few. |
| | | | D5637 | 3 53 20 S.; 126 48 00 E. | 700 | ........ | gy.m. | Few. |
| | | | D5638 | 3 47 15 S.; 126 23 40 E. | 517 | ........ | fne.gy.s. | Few. |
| | | | D5660 | 5 36 30 S.; 120 49 00 E. | 692 | 39.2 | gy. m., s. | Few. |
| | | | H4897 | 7 46 00 N.; 122 00 00 E. | 1,570 | ........ | gy.m., glob. | Common. |
| 9971 | U.S.N.M. | 1 | H4914 | 13 38 05 N.; 120 33 00 E. | 464 | 46.5 | gy.m., s. | Rare. |
| 9966. | U.S.N.M. | 1 | Nero 849 | 15 16 00 N.; 121 40 00 E. | 737 | ........ | gn.m. | Rare. |

### GLOBIGERINA AEQUILATERALIS H. B. Brady.

*Cassidulina globulosa* (part) Egger, Neues Jahrb. für Min., 1857, p. 296, pl. 11, fig. 4.
*Globigerina aequilateralis* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 71; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 605, pl. 80, figs. 18-21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 12, pl. 2, figs. 1-3; pl. 10, fig. 5.

There seem to be two distinct forms of this species in the material which I have examined—one, which may be taken as typical, in which the development is planospiral, with the coiling so loose that it is possible to see between the coils in side view, that is, the coils are not really involute; the other, the variety described below. Such specimens are figured by Brady in the *Challenger* Report and may be taken as the typical form of the species.

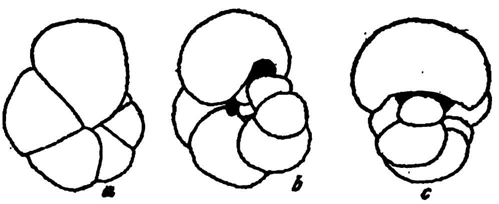

Fig. 11.—Globigerina aequilateralis, var. involuta Cushman. × 50. a, side view; b, from an oblique angle; c, apertural view. From station D5266.

This typical form was far less common than the following one, being found at but 15 stations in the area, but well scattered: China Sea; Sulu Sea; east coast of Luzon, etc., in the Pacific; Sibuko Bay, Borneo; between Gillolo and Makyan Islands; south of Patiente Strait; off Bouro Island, and at a very few stations in the protected waters of the Archipelago; off Batangas Bay, between Marinduque and Luzon; and east of Masbate. The depth of these stations ranges from 26 to 569 fathoms (48 to 1,040 meters), with the average depth 235 fathoms (430 meters). The bottom temperatures range from 44.3° F. to 59° F. (6.8° C. to 15° C.).

*Globigerina aequilateralis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5113... | 13 51 30 N.; 120 50 30..... | 180 | ....... | dk. gn. m.... | Few. |
| | | | D5133... | Island off Panabutan Point, N. 15 W. 0.3 mi. | 26 | ....... | gn. m., s..... | Rare. |
| | | | D5211... | 11 51 35 N.; 124 14 00 E... | 155 | 56.6 | gn. m., s..... | Few. |
| | | | D5216... | 12 52 00 N.; 123 23 30 E... | 200 | 50.2 | ............... | Few. |
| | | | D5222... | 13 38 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m......... | Few. |
| | | | D5266... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p.......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s..... | Rare. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E... | 398 | 44.8 | gn. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5576... | 5 25 56 N.; 120 08 39 E... | 277 | 52.3 | s............. | Few. |
| | | | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s..... | Few. |
| | | | D5625... | 0 07 00 N.; 127 28 00 E... | 280 | ....... | gy. m., fne s. | Few. |
| [illegible] | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 06 00 E... | 569 | ....... | co. s., m..... | Rare. |
| | | | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s..... | Few. |
| | | | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Few. |
| [illegible] | U.S.N.M. | 6 | D5110... | 13 59 20 N.; 120 75 45 E... | 126 | 59.0 | dk. gy. m.... | Few. |
| [illegible] | U.S.N.M. | 2 | H4914... | 13 38 05 N.; 120 33 00 E... | 464 | 46.5 | gy. m., s..... | Few. |

### GLOBIGERINA AEQUILATERALIS H. B. Brady, var. INVOLUTA Cushman.

*Globigerina aequilateralis* H. B. BRADY, var. *involuta* CUSHMAN, Proc. U. S. Nat Mus., vol. 51, 1917, p. 662.

*Description.*—Variety differing from the typical in being much more closely coiled, although planospiral, the last-formed coil decidedly overlapping the previous coils in side view; visible aperture instead of semicircular in the typical in the much broader; whole test less delicately formed.

*Distribution.*—Type specimen (U.S.N.M. No. 9147) from *Albatross* station D5236, in 494 fathoms (903 meters), Pacific Ocean, off eastern coast of Mindanao, bottom temperature, 41.2° F. (5.1° C.). This variety has occurred at 56 other stations well distributed over the area from northern Luzon and the China Sea through the Archipelago, Sulu Sea to Flores Sea. The depths range from 22 to 1,570 fathoms (40 to 2,871 meters), with an average of 359 fathoms (656 meters), the average bottom temperature being 51.4° F. (10.8° C.).

This variety has been distinctive in this mass of material and it seems worthy of separation.

*Globigerina aequilateralis, var. involuta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Few. |
| | | | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m......... | Rare. |
| | | | D5112... | 13 48 22 N.; 120 47 26 E... | 177 | 58.4 | dk. gn. m.... | Frequent. |
| | | | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m.... | Few. |
| | | | D5126... | 10 34 45 N.; 121 47 30 E... | 742 | 40.5 | sft. gn. m.... | Frequent. |
| | | | D5146... | 5 46 40 N.; 120 48 50 E... | 24 | ....... | co. s., sh..... | Few. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh..... | Few. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Few. |
| | | | D5179 .. | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 14384 | U.S.N.M. | 2 | D5184... | 10 18 30 N.; 122 23 30 E... | 565 | 48.8 | gn. m......... | Few. |
| | | | D5187 .. | 9 16 45 N.; 123 21 15 E... | 633 | 49.8 | gn. m......... | Few. |
| 14385 | U.S.N.M. | 8 | D5189...<br>D5191... | 9 56 30 N.; 123 15 00 E... | 225 | 53.6 | sft. gn. m.... | Frequent. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Few. |
| | | | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Frequent. |
| | | | D5208... | 9 58 00 N.; 125 07 40 E... | 775 | 52.9 | gn. m......... | Few. |
| | | | D5213... | 12 15 00 N.; 123 57 30 E... | 80 | ....... | s., m., sh.... | Few. |
| | | | D5214... | 12 26 13 N.; 122 37 15 E... | 218 | 51.4 | gn. m......... | Few. |
| | | | D5215... | 12 31 30 N.; 123 35 24 E... | 604 | 50.5 | gn. m......... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E... | 106 | 63.1 | crs. gy. s..... | Few. |
| | | | D5220... | 13 28 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Few. |
| 9147 | U.S.N.M. | | D5236... | 8 50 45 N.; 126 26 33 E... | 494 | 41.2 | fne. gy. s..... | Few. |
| | | | D5243... | 6 50 55 N.; 126 14 35 E... | 218 | 63.6 | gy. m......... | Few. |
| 14387 | U.S.N.M. | 3 | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m........ | Few. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob.. | Few. |
| | | | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | g., m., s..... | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s., m......... | Few. |
| | | | D5281... | 13 52 45 N.; 120 26 00 E... | 201 | 50.4 | dk. gy. s..... | Few. |
| | | | D5282... | 13 53 00 N.; 120 28 45 E... | 248 | 47.4 | dk. gy. s..... | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E... | 266 | ....... | gy. m., s..... | Few. |
| | | | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh........ | Rare. |
| | | | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., m..... | Rare. |
| | | | D5342... | 10 56 55 N.; 119 17 24 E... | 145 | ....... | gy. m......... | Rare. |
| | | | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | co. s......... | Few. |
| 14386 | U.S.N.M. | 3 | D5374... | 13 46 45 N.; 121 35 06 E... | 190 | ....... | gy. m......... | Few. |
| | | | D5381... | 13 14 15 N.; 123 44 25 E... | 88 | ....... | co. s......... | Few. |
| | | | D5430... | 9 49 40 N.; 119 08 20 E... | 464 | 50.0 | glob. oz...... | Rare. |
| | | | D5445 .. | 12 44 42 N.; 124 59 50 E... | 283 | 44.3 | gn. m., s..... | Rare. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m......... | Few. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............... | Rare. |
| | | | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.2 | gn. m., glob. | Few. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob. | Few. |
| | | | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Few. |

*Globigerina aequilateralis*, var. *involuta*—*Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | | | |
| | | | D5546 .. | 6 06 48 N.; 121 20 32 E... | 133 | 58.3 | fne. co. s..... | Few. |
| | | | D5565... | 5 51 42 N.; 120 30 30 E... | 243 | 52.3 | s., ptr., sh... | Rare. |
| | | | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh........ | Few. |
| | | | D5601... | 1 13 10 N.; 125 17 05 E... | 765 | ....... | s., glob., ptr. | Few. |
| | | | D5612... | 0 33 00 S.; 121 45 40 E... | 750 | ....... | ............... | Few. |
| | | | D5622... | 0 19 20 N.; 127 23 30 E... | 275 | ....... | gy. m........ | Rare. |
| | | | D5626... | 0 07 30 N.; 127 29 00 E... | 265 | ....... | gy. m., fne. s. | Few. |
| | | | D5627... | 0 06 00 N.; 127 26 00 E... | 22 | ....... | m........... | Few. |
| | | | D5632... | 1 00 00 S.; 127 50 00 E... | 845 | ....... | ............... | Few. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Few. |
| | | | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ....... | fne. gy. s..... | Few. |
| | | | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s.... | Few. |
| | | | D5665... | 4 27 00 S.; 118 44 00 E... | 1,008 | ....... | m........... | Few. |
| | | | H4897... | 7 46 00 N.; 122 00 00 E... | 1,570 | ....... | gy. m., glob. | Frequent. |
| | | | H4937... | 5 32 50 S.; 120 49 10 E... | 885 | 38.2 | gy. m....... | Rare. |

### GLOBIGERINA CONGLOMERATA Schwager.

*Globigerina conglomerata* SCHWAGER, *Novara*-Exped., Geol. Theil., pt. 2, 1866, p. 255, p. 7, fig. 113.

*Description.*—Test globose, final whorl of three or four chambers, usually the fourth overlapping the first, chambers very high, much inflated; spire somewhat raised, but not greatly so; umbilical region open widely; wall coarsely perforate.

Diameter up to 1 mm.

*Distribution.*—Specimens of this species were best developed at *Albatross* station D5613, in 752 fathoms (1,375 meters), Gulf of Tomini, Celebes.

This material in ventral view is very much like the original figure, and Brady remarks that his material obtained from Schwager showed "an approach toward the general form of *Globigerina conglobata*," which our material decidedly does, but in form only. At this station the species stood out very clearly from all others.

*Globigerina conglomerata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1683 | U.S.N.M. | 4 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Few. |

## Genus ORBULINA d'Orbigny, 1839.

### ORBULINA UNIVERSA d'Orbigny.

*Orbulina universa* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 3, pl. 1, fig. 1.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 608, pl. 78; pl. 81, figs. 8–26; pl. 82, figs. 1–3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 14, pl. 6; pl. 7; pl. 11, fig. 3.

Strangely enough, *Orbulina universa*, which is one of the commonest of Foraminifera, does not seem to be at all well represented in the Philippine material I have had. To be sure, typical Globigerina-ooze deposits are not the common bottom in the region, bu *Globigerina* is not nearly so restricted in the area. It has occurre at several stations—in the Flores Sea; Sulu Sea; Sogod Bay, souther Leyte; Pacific Ocean, east coast of Mindanao; off southeaster Mindoro; between Marinduque and Luzon; and east of Masbat Island. The stations range in depth from 20 to 885 fathoms (37 t 1,618 meters). The average depth is 376 fathoms (689 meters The bottom temperatures where given range from 38.2° to 63.1° (3.4° C. to 17.2° C.), the average being 51.2° F. (10.7° C.).

*Orbulina universa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m.... | Rare. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Few. |
| 12496 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m...... | Rare. |
| 12497 | U.S.N.M. | | D5203... | 9 58 00 N.; 125 07 40 E.. | 775 | 52.9 | gn. m........ | Rare. |
| 12693 | U.S.N.M. | 2 | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s..... | Rare. |
| | | 2 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s..... | Few. |
| | | | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s......... | Frequent. |
| 12671 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Abundan |
| | | | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | ....... | gn. m........ | Few. |
| 12692 | U.S.N.M. | 6 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| | | | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s..... | Rare. |
| 14904 | U.S.N.M. | 2 | H4937... | 5 32 50 S.; 120 49 10 E.. | 885 | 38.2 | gy. m........ | Rare. |

### Genus CANDEINA d'Orbigny, 1839.

#### CANDEINA NITIDA d'Orbigny.

*Candeina nitida* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 183 "Foraminifères," p. 108, pl. 2, figs. 27, 28.—H. B. BRADY, Rep. Voy. *Challenge* Zoology, vol. 9, 1884, p. 622, pl. 82, figs. 13–20.—CUSHMAN, Bull. 71, U. S. Na Mus., pt. 4, 1914, p. 16, pl. 11, fig. 1.

A single station seems to be the only record for this species- *Albatross* D5638, in 517 fathoms (946 meters), off Bouro Island.

*Candeina nitida—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12763 | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s..... | Rare. |

#### CANDEINA NITIDA d'Orbigny, var. TRILOBA, new variety.

Plate 57, figs. 1*a–c*.

*Description.*—Variety differing from the typical in that the la three chambers compose the whole external surface of the test, th spire being enveloped.

*Distribution.*—Type specimen (U.S.N.M. No. 14388) and othe from *Albatross* station D5191, in 258 fathoms (472 meters), Tano Strait, east coast of Negros.

This is a peculiar modification which is thus placed, but which has a rougher, more punctate surface than typical *C. nitida*, and yet has a series of pores along the junctions of the chambers.

*Candeina nitida*, var. *triloba*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5191...<br>D5613... | 10 29 45 N.; 123 31 15 E..<br>0 42 00 S.; 121 44 00 E.. | 258<br>752 | 62.8<br>....... | gn. m.......<br>gy. m....... | Rare. |

## Genus SPHAEROIDINA d'Orbigny, 1826.

### SPHAEROIDINA BULLOIDES d'Orbigny.

*Sphaeroidina bulloides* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 267, No. 1; Modèles, 1826, No. 65.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 620, pl. 84, figs. 1-7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 18, pl. 10, fig. 7; pl. 12, fig. 1.

Like *Orbulina universa* this species seems to be limited in the region, while the other species of the genus is very much more common. It occurred at the following stations: D5178, in 78 fathoms (143 meters), vicinity of Romblon; D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.); and D5638, in 517 fathoms (946 meters), off Bouro Island.

*Sphaeroidina bulloides*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible]<br>[illegible] | U.S.N.M. | 4 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s..... | Rare. |

### SPHAEROIDINA DEHISCENS Parker and Jones.

*Sphaeroidina dehiscens* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 369, pl. 19, figs. 5*a*, *b*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 621, pl. 84, figs. 8-11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 19, pl. 10, fig. 2; pl. 13, fig. 1.

*Globigerina seminulina* SCHWAGER, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 256, pl. 7, fig. 112.

In contrast with the preceding species this one has been noted at 43 stations in the region. It is rather interesting, however, to note that but very few of these are really among the islands of the Archipelago proper, but, except in the Sulu Sea, the records are mainly from the China Sea; Gulf of Davao; Palawan Passage; Gulf of Tomini, Celebes; Molucca Passage; between Gillolo and Makyan and between Gillolo and Kayao; Patiente Strait; Pitt Passage; off Bour Island; Molucca Sea; and Gulf of Boni. Besides these regions, mos of which are outside the Philippine Archipelago proper, the specie has occurred on the Pacific side of Luzon and Mindanao; Verd Island Passage; between Burias and Luzon; and in Sogod Bay southern Leyte.

These stations range in depth from 80 to 1,570 fathoms (146 t 2,871 meters), with the average 428 fathoms (783 meters). Th average bottom temperature was 51.9° F. (11° C.); but this is to high, as the bottom temperature is not given for many of the deepe stations.

The specimens are very typical, but only at *Albatross* statio D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast o Mindanao, could it be called abundant. There specimens were ver abundant and well developed. The bottom temperature there, how ever, was 41.2° F.

*Sphaeroidina dehiscens—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13177 | U.S.N.M. | 10+ | D5110... | 13 59 30 N.: 120 75 45 E... | 135 | 58.0 | dk. gy. m... | Common. |
| | | | D5113... | 13 51 30 N.: 120 50 30 E... | 159 | | dk. gn. m... | Few. |
| | | | D5114... | 13 36 11 N.: 120 45 26 E... | 340 | | fne. s. | Few. |
| | | | D5115... | 13 37 11 N.: 120 43 40 E... | 340 | | | Few. |
| | | | D5121... | 13 27 20 N.: 121 17 45 E... | 106 | | dk. gn. m... | Several. |
| | | | D5173... | 6 08 15 N.: 120 35 30 E... | 318 | | fne. s., sh... | Frequent. |
| | | | D5201... | 10 10 00 N.: 126 04 15 E... | 554 | 52.8 | gy. s., m. | Few. |
| | | | D5212... | 12 04 15 N.: 124 04 36 E... | 106 | 50.9 | gy. s., m. | Few. |
| | | | D5217... | 13 20 00 N.: 123 14 15 E... | 105 | 63.1 | crs. gy. s. | Few. |
| 13176 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.: 126 26 52 E... | 494 | 41.2 | fne. gy. s. | Abundant |
| | | | D5247... | 7 02 00 N.: 125 38 45 E... | 135 | | m. | Few. |
| | | | D5267... | 13 42 20 N.: 120 58 25 E... | | | p., s., sh. | Rare. |
| | | | D5268... | 13 42 00 N.: 120 57 15 E... | 170 | | s. p. | Few. |
| | | | D5277... | 13 56 55 N.: 120 13 45 E... | 80 | 58.6 | fne. s. | Rare. |
| | | | D5281... | 13 52 45 N.: 120 25 00 E... | 201 | 50.4 | dk. gy. s. | Rare. |
| | | | D5282... | 13 53 00 N.: 120 26 45 E... | 248 | 47.4 | dk. gy. s. | Few. |
| 13223 | U.S.N.M. | 3 | D5300... | 20 31 00 N.: 115 49 00 E... | 265 | | gy. m., s. | Rare. |
| | | | D5301... | 20 37 00 N.: 115 43 00 E... | 208 | 50.5 | gy. m., s. | Rare. |
| | | | D5313... | 21 30 00 N.: 116 43 00 E... | 150 | 53.6 | s. | Few. |
| | | | D5348... | 10 57 45 N.: 118 38 15 E... | 300 | | | Rare. |
| | | | D5428... | 9 13 00 N.: 118 51 15 E... | 1,105 | 49.7 | gy. m. | Few. |
| | | | D5443... | 12 43 05 N.: 125 01 00 E... | 241 | 51.3 | co. s., sh. | Rare. |
| | | | D5446... | 12 43 51 N.: 124 59 18 E... | 300 | | gn. m. | Frequent. |
| | | | D5449... | 13 21 36 N.: 124 00 30 E... | 300 | | | Rare. |
| | | | D5542... | 8 48 30 N.: 123 35 30 E... | 200 | 54.3 | fne. s., brk. sh | Rare. |
| 13175 | U.S.N.M. | 2 | D5543... | 8 47 15 N.: 123 35 00 E... | 168 | 54.5 | s. | Few. |
| | | | D5551... | 5 54 48 N.: 120 44 24 E... | 193 | 53.3 | fne. s. | Rare. |
| | | | D5570... | 5 32 15 N.: 120 12 57 E... | 330 | 52.3 | fne. s., glob. | Rare. |
| | | | D5612... | 0 38 00 S.: 121 46 40 E... | 750 | | | Frequent. |
| | | | D5614... | 0 31 00 N.: 125 58 45 E... | 1,100 | | gy. m., s., glob | Few. |
| | | | D5618... | 0 37 00 N.: 127 15 00 E... | 417 | | gy. m. | Few. |
| | | | D5621... | 0 15 00 N.: 127 24 35 E... | 298 | | gy. and bk. s | Frequent. |
| | | | D5623... | 0 16 30 N.: 127 30 00 E... | 272 | | fne. s., m... | Rare. |
| | | | D5625... | 0 07 00 N.: 127 28 00 E... | 230 | | gy. m., fne. s. | Rare. |
| | | | D5626... | 0 07 30 N.: 127 29 00 E... | 245 | | gy. m., fne. s. | Rare. |
| 12752 | U.S.N.M. | 5 | D5630... | 0 56 30 S.: 128 05 00 E... | 569 | | co. s. m. | Frequent. |
| | | | D5636... | 1 55 00 S.: 127 42 30 E... | 1,262 | | gy. m., fne. s. | Few. |
| | | | D5637... | 3 53 20 S.: 126 48 00 E... | 700 | | gy. m. | Rare. |
| | | | D5638... | 3 47 15 S.: 126 23 40 E... | 617 | | fne. gy. s. | Few. |
| | | | D5639... | 3 54 50 S.: 123 27 20 E... | 1,560 | | gy. m. | Frequent. |
| | | | D5650... | 4 53 45 S.: 121 29 00 E... | 540 | 48.1 | gn. m. | Few. |
| | | | H4897... | 7 46 00 N.: 122 08 00 E... | 1,570 | | gy. m., glob. | Few. |
| | | | H4937... | 5 32 50 S.: 120 49 10 E... | 385 | 38.2 | gy. m. | Few. |
| 9966 | U.S.N.M. | 1 | Nero 849 | 15 16 00 N.: 121 40 00 E... | 737 | | gn. m. | Rare. |

## Genus PULLENIA Parker and Jones, 1862.

### PULLENIA SPHAEROIDES (d'Orbigny).

*Nonionina sphaeroides* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 293, No. 1.

*Pullenia sphaeroides* PARKER and JONES, in Carpenter, Parker, and Jones. Introd. Foram., 1862, p. 184, pl. 12, fig. 12.—H. B. BRADY, Rep Voy. *Challenger*, Zoology, vol. 9, 1884, p. 615, pl. 84, figs. 12, 13, text figure 18, p. 616.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 20, pl. 11, fig. 2.

The only record for this species in the region is *Albatross* station 5639, Molucca Sea, in 1,560 fathoms (2,853 meters). This is the deepest station dredged by the *Albatross*. This specimen is very typical, but larger than usual.

*Pullenia sphaeroides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5639... | ° ′ ″ ° ′ ″<br>3 54 50 S.; 123 27 20 E... | 1,560 | °F.<br>....... | gy. m....... | Rare. |

### PULLENIA QUINQUELOBA (Reuss).

*Nonionina quinqueloba* REUSS, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 47, pl. 5, figs. 31*a*, *b*.

*Pullenia quinqueloba* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 617, pl. 84, figs. 14, 15.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 21, pl. 13, fig. 2.

Single very typical specimens occur at two stations—D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms, (903 meters), and D5526, between Siquijor and Bohol Islands, 805 fathoms (1, 472 meters).

All of the records for this species elsewhere are in comparatively deep water, and it never seems to occur in any considerable numbers.

*Pullenia quinqueloba—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.. | 494 | °F.<br>41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Rare. |

### PULLENIA OBLIQUILOCULATA Parker and Jones.

*Pullenia obliquiloculata* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 368, pl. 19, figs. 4*a*, *b*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 618, pl. 84, figs. 16–20.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 22, pl. 10, fig. 3; pl. 12, figs. 2, 3.

This is by far the commonest species of the genus in the area. I have noted its occurrence in material from over a hundred stations in the area, but, as in the case of *Sphaeroidina dehiscens*, the gre majority of the stations are in the China Sea, off the Pacific coast the islands, or the greater bodies of water to the south; off Bou Celebes, Gillolo, Patiente Strait, Pitt Passage, Molucca Sea, But Strait, Gulf of Boni, Flores Sea, and Macassar Strait. At the f stations inside the Archipelago the specimens were few, while in t deeper waters outside they are often very common.

The range of depth of these stations ranges from 10 to 1,570 fatho (18 to 2,871 meters), the average being 363 fathoms (664 meter and the average bottom temperature for 51 stations at which t bottom temperature was given was 51.8° F. (10.9° C.). This much too high, however, for at most of the deeper stations the te perature was not given.

*Pullenia obliquiloculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s., sh | Few. |
| | | | D5108... | 14 17 15 N.; 120 22 40 E.. | 35 | ....... | gy. s........ | Few. |
| | | | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | co.......... | Few. |
| 13172 | U.S.N.M. | 10+ | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 50.0 | dk. gy. m... | Common |
| | | | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Frequent |
| | | | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m... | Frequent |
| | | | D5114... | 13 36 11 N.; 120 45 26 E.. | 340 | ....... | fne. s........ | Common. |
| | | | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ....... | .............. | Common. |
| | | | D5120... | 13 45 30 N.; 120 30 15 E.. | 383 | 43.7 | gn. m., s.... | Few. |
| | | | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Few. |
| | | | D5126... | 10 34 45 N.; 121 47 30 E.. | 742 | 40.5 | sft. gn. m... | Few. |
| | | | D5132... | Id. off Panabutan Pt. N. 15, W. 0.3 mi. | 26 | ....... | gn. m., s.... | Few. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E.. | 40 | ....... | co. s., sh.... | Frequent. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Common. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Common. |
| | | | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Few. |
| | | | D5184... | 10 18 30 N.; 122 23 30 E.. | 565 | 40.8 | gn. m........ | Few. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E.. | 638 | 40.8 | gn. m........ | Frequent |
| | | | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft. gn. m.... | Frequent |
| | | | D5189... | 9 56 30 N.; 123 15 00 E.. | 300 | 52.8 | gn. m........ | Few. |
| | | | D5191... | 10 29 45 N.; 123 31 15 E.. | 258 | 62.8 | gn. m........ | Common. |
| | | | D5192... | 11 19 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Few. |
| | | | D5201... | 10 10 00 N.; 126 04 15 E.. | 554 | 52.8 | gy. s., m.... | Common. |
| | | | D5203... | 9 58 00 N.; 125 07 40 E.. | 775 | 52.9 | gn. m........ | Common. |
| | | | D5206... | 11 31 40 N.; 124 42 40 E.. | 32 | ....... | gn. m........ | Few. |
| | | | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s..... | Few. |
| | | | D5215... | 12 31 30 N.; 123 35 24 E.. | 604 | 50.5 | gn. m........ | Few. |
| | | | D5216... | 12 52 00 N.; 123 23 30 E.. | 200 | 50.2 | .............. | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Frequent. |
| | | | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m........ | Common. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Few. |
| | | | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m........ | Few. |
| | | | D5257... | 7 22 12 N.; 124 12 15 E.. | 28 | ....... | m............ | Few. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Abundan |
| | | | D5260... | 12 25 35 N.; 121 31 35 E.. | 294 | 51.4 | gn. m., s.... | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Few. |
| | | | D5267... | 13 42 20 N.; 120 58 25 E.. | 170 | ....... | p., s., sh...... | Rare. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p.......... | Common. |
| | | | D5282... | 13 58 00 N.; 120 28 45 E.. | 248 | 47.4 | dk. gy. s.... | Few. |
| | | | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Few. |
| | | | D5291... | 13 29 40 N.; 121 00 45 E.. | 173 | 51.5 | fne. bk. s.... | Few. |
| 12750 | U.S.N.M. | 10+ | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Common. |
| | | | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |
| | | | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Frequent. |
| | | | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Few. |
| | | | D5342... | 10 58 55 N.; 119 17 34 E.. | 14 | ....... | gy. m........ | Few. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 54.4 | co. s........ | Few. |
| | | | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | co. s........ | Common. |
| | | | D5370... | 13 44 15 N.; 121 42 30 E.. | 159 | 54.3 | sft. m....... | Few. |
| | | | D5377... | 13 26 00 N.; 122 19 00 E.. | 240 | 54.3 | crs. s........ | Rare. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E.. | 88 | ....... | co. s........ | Few. |

*Pullenia obliquiloculata*—*Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| | | | D5394 | 12 00 30 N.; 124 05 36 E. | 153 | ...... | gn. m. | Few. |
| | | | D5428 | 9 13 00 N.; 118 51 15 E. | 1,105 | 49.4 | gy. m. | Few. |
| | | | D5430 | 9 49 40 N.; 119 03 20 E. | 464 | 50.0 | glob. oz. | Rare. |
| | | | D5443 | 12 43 06 N.; 125 01 09 E. | 241 | 51.3 | co. s., sh. | Frequent. |
| | | | D5445 | 12 44 42 N.; 124 59 50 E. | 383 | 44.3 | gn. m., s. | Few. |
| | | | D5449 | 13 21 36 N.; 124 00 30 E. | 300 | ...... | ...... | Few. |
| | | | D5459 | 13 10 21 N.; 123 59 54 E. | 201 | ...... | ...... | Few. |
| | | | D5467 | 13 35 27 N.; 123 37 18 E. | 490 | ...... | gy. m. | Few. |
| | | | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | ...... | gn. m. | Few. |
| | | | D5470 | 13 37 30 N.; 123 41 09 E. | 560 | ...... | m. | Few. |
| | | | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | ...... | s., sh., g. | Few. |
| | | | D5512 | 8 16 02 N.; 123 58 26 E. | 445 | 52.8 | gy. m., fne. s | Frequent. |
| | | | D5523 | 8 48 44 N.; 123 27 35 E. | ...... | ...... | ...... | Few. |
| | | | D5526 | 9 12 45 N.; 123 45 30 E. | 806 | 52.3 | gn. m., glob. | Common. |
| | | | D5529 | 9 23 45 N.; 123 30 30 E. | 441 | 53.0 | gy. m., glob. | Frequent. |
| | | | D5542 | 8 48 30 N.; 123 35 30 E. | 200 | 54.3 | fne. s., brk. sh. | Few. |
| | | | D5543 | 8 47 15 N.; 123 35 00 E. | 162 | 54.5 | s. | Few. |
| | | | D5546 | 6 06 48 N.; 121 20 32 E. | 138 | 58.3 | fne. co., s. | Few. |
| | | | D5548 | 6 00 20 N.; 120 45 35 E. | 232 | 53.5 | s., brk. sh. | Few. |
| | | | D5549 | 6 01 15 N.; 120 44 20 E. | 263 | 52.3 | s., glob. for. | Few. |
| | | | D5551 | 5 54 48 N.; 120 44 24 E. | 198 | 53.3 | fne., s. | Few. |
| | | | D5565 | 5 51 42 N.; 120 30 30 E. | 243 | 52.3 | s., ptr., sh. | Few. |
| | | | D5570 | 5 32 15 N.; 120 12 57 E. | 330 | 52.3 | fne. s., glob. | Few. |
| | | | D5571 | 5 30 45 N.; 120 07 57 E. | 340 | 52.3 | s., sh. | Few. |
| [illegible] | U.S.N.M. | 4 | D5572 | 5 31 26 N.; 120 09 45 E. | 334 | 52.3 | s | Common. |
| | | | D5576 | 5 25 56 N.; 120 03 39 E. | 277 | 53.3 | s | Few. |
| | | | D5579 | 4 54 15 N.; 119 09 52 E. | 175 | 55.3 | fne. s., Co | Few. |
| | | | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | br. s., Co | Common. |
| | | | D5590 | 4 10 50 N.; 118 39 35 E. | 310 | 44.3 | gn. m., s. | Few. |
| | | | D5601 | 1 13 10 N.; 125 17 05 E. | 765 | ...... | s., glob., ptr. | Common. |
| | | | D5612 | 0 28 00 S.; 121 45 40 E. | 750 | ...... | ...... | Few. |
| | | | D5614 | 0 31 00 N.; 125 58 45 E. | 1,100 | ...... | gy. m., s., glob. | Frequent. |
| | | | D5618 | 0 37 00 N.; 127 15 00 E. | 417 | ...... | gy. m. | Few. |
| | | | D5620 | 0 21 30 N.; 127 16 45 E. | 358 | ...... | gy. m. | Few. |
| [illegible] | U.S.N.M. | 7 | D5621 | 0 15 00 N.; 127 24 35 E. | 298 | ...... | gy. and bk. s. | Frequent. |
| | | | D5622 | 0 19 20 N.; 127 28 30 E. | 275 | ...... | gy. m. | Frequent. |
| | | | D5623 | 0 16 30 N.; 127 30 00 E. | 272 | ...... | fne. s., m. | Few. |
| | | | D5625 | 0 07 00 N.; 127 28 00 E. | 230 | ...... | gy. m., fne. s. | Common. |
| | | | D5626 | 0 07 30 N.; 127 29 00 E. | 265 | ...... | gy. m., fne. s. | Few. |
| | | | D5627 | 0 06 00 N.; 127 26 00 E. | 22 | ...... | ...... | Few. |
| | | | D5630 | 0 56 30 S.; 128 05 00 E. | 569 | ...... | co. s., m. | Common. |
| | | | D5632 | 1 00 00 S.; 127 50 00 E. | 845 | ...... | ...... | Few. |
| | | | D5636 | 1 55 00 S.; 127 42 30 E. | 1,262 | ...... | gy. m., fne. s. | Frequent. |
| | | | D5637 | 3 53 20 S.; 126 48 00 E. | 700 | ...... | gy. m. | Few. |
| | | | D5638 | 3 47 15 S.; 126 23 40 E. | 517 | ...... | fne. gy. s. | Frequent. |
| | | | D5639 | 3 54 50 S.; 123 27 20 E. | 1,560 | ...... | gy. m. | Frequent. |
| | | | D5648 | 5 35 00 S.; 122 20 00 E. | 559 | ...... | gn. m. | Rare. |
| | | | D5650 | 4 53 45 S.; 121 29 00 E. | 540 | 40.1 | gn. m. | Few. |
| | | | D5652 | 4 35 00 S.; 121 23 06 E. | 525 | 41.2 | gn. m. | Few. |
| | | | D5660 | 5 36 30 S.; 120 49 00 E. | 692 | 39.2 | gy. m., s. | Frequent. |
| | | | D5665 | 4 27 00 S.; 118 44 00 E. | 1,006 | ...... | m. | Common. |
| [illegible] | U.S.N.M. | 2 | H4914 | 13 38 05 N.; 120 33 00 E. | 464 | 46.5 | gy. m., s. | Few. |
| | | | H4997 | 7 46 00 N.; 122 03 00 E. | 1,570 | ...... | gy. m., glob. | Common. |
| | | | H4937 | 5 32 50 S.; 120 49 10 E. | 885 | 38.2 | gy. m. | Few. |

## Family ROTALIIDAE.

### Subfamily SPIRILLININAE.

### Genus SPIRILLINA Ehrenberg, 1841.

**SPIRILLINA LIMBATA H. B. Brady.**

*Spirillina limbata* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 278, pl. 8, figs. 26*a*, *b*; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 632, pl. 85, figs. 18-21.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 5, pl. 2, figs. 1, 2, fig. 5 (in text).

The only specimens in the material which can be referred to the typical form of this species are from *Albatross* station D5179, off

Romblon, in 37 fathoms (68 meters). The material here noted has a tendency to be tuberculate on the underside, as in the second variety here recorded. Brady did not figure the underside of this species, but the description infers that it is smooth.

*Spirillina limbata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 14406 | U.S.N.M. | 1 | D5179... | 12° 38′ 15″ N.; 122° 12′ 30″ E... | 37 | ° F.<br>75.7 | hrd. s....... | Rare. |

### SPIRILLINA LIMBATA H. B. Brady, var. DENTICULATA H. B. Brady.

*Spirillina limbata* H. B. BRADY, var. *denticulata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 632, pl. 85, fig. 17.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 5, pl. 3, figs. 1, 2.

This variety, although apparently much more common than the typical, occurred, as far as the material shows, at one station—D5179, off Romblon, in 37 fathoms (68 meters), with both the typical and the following variety. It is undoubtedly common in the region, although material was not saved.

*Spirillina limbata, var. denticulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 14407 | U.S.N.M. | 1 | D5179... | 12° 38′ 15″ N.; 122° 12′ 30″ E... | 37 | ° F.<br>75.7 | hrd. s....... | Rare. |

### SPIRILLINA LIMBATA H. B. Brady, var. TUBERCULO-LIMBATA Chapman.

*Spirillina tuberculo-limbata* CHAPMAN, Journ. Linn. Soc. London, Zoology, vol. 28, 1900, p. 11, pl. 1, figs. 8*a-c*.
*Spirillina limbata* H. B. BRADY, var. *papillosa* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 6, pl. 2, fig. 4.

From an examination of the Philippine material it seems that Chapman's species, described from Funafuti, and the variety I described from the Hawaiian Islands, are probably the same. The occurrence of this variety with the typical seems to show that it is but a varietal form, as the differences are largely in ornamentation and the number of coils of the test.

It has occurred at D5178, in 78 fathoms (143 meters), and D5179 in 37 fathoms (68 meters), both stations off Romblon. The bottom temperature at the shallower station is 75.7° F., (24.2° C.).

These records indicate that this variety is widely distributed in the Indo-Pacific region.

*Spirillina limbata*, var. *tuberculo-limbata*—*Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Rare. |

## Subfamily ROTALINAE.

### Genus PATELLINA Williamson, 1858.

#### PATELLINA CORRUGATA Williamson.

*Patellina corrugata* WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 46, pl. 3, figs. 86–89.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 634, pl. 86, figs. 1–7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 9, pl. 7, fig. 1.

A single specimen of this species was found at *Albatross* station, D5551, in 193 fathoms (353 meters), bottom temperature 53.3° F. 11.8° C.), near Jolo Island. This is the only station at which the species was noted in all the abundant material from the Philippine Expedition, and it seems to be decidedly rare in this region. The *Challenger* did not obtain the species from the Philippine stations dredged during that expedition. Millett records it as "rather scarce" in the Malay Archipelago. The only records for the North Pacific outside this region are two records of a single specimen from each station from Laysan and Chatham Islands, recorded by Rhumbler.

The single Philippine specimen was a very typical and well-developed one.

*Patellina corrugata—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E.. | 193 | 53.3 | fne. s........ | Rare. |

### Genus DISCORBIS Lamarck, 1804.

This genus is one which is either in a state of flux with a few very variable species or else is represented by many species. Heron-Allen and Earland have given much attention to this problem in their Clare Island work.[19] A comparison of the figures of the *Challenger* Report with the original figures of the species to which Brady referred his material will show that in most cases the choice of names was hardly wise. So other writers, following the *Challenger* determinations and adding their own variant views, have created a complexity of nomenclature that it is very difficult to unravel. However, the figures of the *Challenger* Report are very accurate, and a study of the originals with notes as to their occurrence would help much. In the Philippine material the genus has been very poorly represented, probably because the specimens are usually small and were lost in the original washing. Therefore, it is impossible with the meagre material to add greatly to the clearing up of the problems waiting to be solved. In certain of the species reference to the *Challenger* figures is given rather than describing them as new.

### DISCORBIS SUBOBTUSA, new species.

Plate 70, figs. 2*a*–*c*.

*Description.*—Test circular in outline, periphery rounded, chambers about six or seven in the last-formed coil; sutures oblique, distinct, flush with the surface, ventral side more rounded; sutures nearly at right angles to the periphery, ending in slight, blunt projections in the middle, slightly umbilicate; aperture narrow, the elongate base of the last-formed chamber extending about halfway from the umbilicus to the periphery; wall smooth and slightly polished, punctate.

Diameter about 1.5 mm.

*Distribution*—Type specimen (Cat. No. 15356 U. S. N. M.) from *Albatross* station D5236, off the east coast of Mindanao, in 494 fathoms (903 meters).

This is a large species, different from any others in the region. It is not found elsewhere.

*Discorbis subobtusa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15356 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s...... | Rare. |

### DISCORBIS VILARDEBOANA (?) d'Orbigny.

The material from *Albatross* D5144, off Jolo, in 19 fathoms (35 meters), is almost exactly like the figure given by Brady in plate 86, figure 12, of the *Challenger* Report. It is evidently not the same as d'Orbigny's *Rosalina vilardeboana*, as a comparison of the two will at once show.

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[19] The Foraminifera of the Clare Island District, County Mayo, Ireland, Proc. Royal Irish Acad., vol. 31, pt. 64, 1913, pp. 110–141.

From another station off Jolo, D5546, in 138 fathoms (252 meters), is a specimen which might almost have served for the original of Brady's plate 86, figure 9. This form is referred to *D. mediterranensis* d'Orbigny by Heron-Allen and Earland, but does not seem the same as their figured specimens from Clare Island.

*Discorbis vilardeboana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E... | 138 | 58.3 | fne. co. s..... | Rare. |

DISCORBIS ORBICULARIS (Terquem).

*Rosalina orbicularis* Terquem, Anim. Plage Dunkerque, 1876, p. 75, pl. 9, figs. 4a, 4b.

*Discorbis orbicularis* Berthelin, Foram. Bourgneuf et Pornichet, 1878, p. 39, No. 63.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 16, pl. 11, fig. 1, figs. 18a–c (in text).

*Discorbina orbicularis* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 647, pl. 88, figs. 4–8.

Specimens which are close to this species were obtained from two stations—D5139, in 20 fathoms (37 meters), and D5141, in 29 fathoms (53 meters), both off Jolo.

*Discorbis orbicularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 2 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5141... | 6 09 00 N.: 120 58 00 E... | 29 | ....... | co. s......... | Rare. |

DISCORBIS BERTHELOTI (d'Orbigny).

Plate 59, figs. 1a–c.

*Rosalina berthelotі* d'Orbigny, in Barker, Webb, and Berthelot, Hist. Nat. Îles Canaries, vol. 2, pt. 2, "Foraminifères," 1839, p. 135, pl. 1, figs. 28–30.

*Discorbina bertheloti* H. B. Brady, Trans. Linn. Soc. London, vol. 24, 1864, p. 469, pl. 48, figs. 10a, b; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 650, pl. 89, figs. 10–12.

*Discorbis bertheloti* Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 20, pl. 7, fig. 3, fig. 23 (in text).

Rare specimens referred to this species were obtained at the following stations: D5164, in 18 fathoms (33 meters), off Tawi Tawi; D5179,

[illegible]

in 37 fathoms (68 meters), off Romblon; D5220, in 50 fathoms (91 meters), between Marinduque and Luzon; D5268, in 170 fathoms (311 meters), Verde Island Passage; D5551, in 193 fathoms (353 meters), off Jolo; and D5576, north of Tawi Tawi, 277 fathoms (506 meters); bottom temperature 53.3° F. (11.8° C.).

*Discorbis bertheloti—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14396 | U.S.N.M. | 1 | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m......... | Rare. |
| 14395 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s......... | Rare. |
| 14398 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m..... | Rare. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | p., s., sh...... | |
| 14397 | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E... | 193 | 53.3 | fne. s......... | Rare. |
| 15702 | U.S.N.M. | 1 | D5576... | 5 26 56 N.; 120 03 30 E... | 277 | 53.3 | s............. | Rare. |

### DISCORBIS ALLOMORPHINOIDES (Reuss).

Plate 58, figs. 1*a–c*.

*Valvulina allomorphinoides* Reuss, Sits. Akad. Wiss. Wien, vol. 40, 1860, p. 223, pl. 11, fig. 6.

*Discorbina allomorphinoides* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 654, pl. 91, figs. 5, 8.

*Discorbis allomorphinoides* Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 21, pl. 9, fig. 1, figs. 25*a–c* (in text).

Rare specimens occurred in material from two stations, D5261, in 145 fathoms (265 meters), off southeastern Mindoro, and D5381, in 88 fathoms (161 meters), in Ragay Gulf, Luzon.

*Discorbis allomorphinoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14404 | U.S.N.M. | 2 | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s., m......... | Rare. |
| 14405 | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s......... | Rare. |

### DISCORBIS RUGOSA (d'Orbigny).

Plate 60, figs. 2*a–c*.

*Rosalina rugosa* d'Orbigny, Foram. Amér. Mérid., 1839, p. 42, pl. 2, figs. 12-14.

*Discorbina rugosa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 652, pl. 87, figs. 3*a–c*; pl. 91, figs. 4*a–c*.

A specimen referable to this species occurred at *Albatross* station D5144, off Jolo in 19 fathoms (35 meters). It is close to Brady's figure. The species seems to be largely recorded from the Indo-Pacific in comparatively shallow water. A few specimens were obtained at D5236, in 494 fathoms (903 meters), off Mindanao.

*Discorbis rugosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5144...<br>D5236... | 6 05 50 N.; 121 02 15 E....<br>8 50 45 N.; 126 26 52 E.... | 19<br>494 | .......<br>41.2 | co. s.........<br>fne. gy. s..... | Rare. |

### DISCORBIS, species (?).

Plate 60, figs. 1*a*–*c*.

*Discorbina saulcii* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 653, pl. 91, figs. 6*a*–*c* (not *Rosalina saulcyi* d'Orbigny, 1839).

It is very difficult to understand how Brady could have referred his material figured in the *Challenger* Report to the species figured by d'Orbigny. Brady refers to this material from the Gulf of Scala Nova, off Smyrna, and *Challenger* material from off Tahiti.

Sidebottom has figured material from the Bay of Palermo, Sicily[20] which he refers to this species. He mentions (p. 26) that the material from Sicily agrees with material he has from the coast of Algiers in 80 fathoms (146 meters). He also mentions the Bay of Eleusis, Greece.

As figured, the Mediterranean material has no definite carinate border, is not so rounded as the *Challenger* figure and has a different appearance on the umbilical side.

Therefore, as the matter stands, I would venture to predict that the true *D. saulcyi* of d'Orbigny may be confined to the west coast of South America and adjacent regions, while there are two other distinct species—that figured by Sidebottom, probably a Mediterranean one, widely spread in that region; and a third—that figured by Brady, which is characteristic of the Indo-Pacific. To which of these two the material referred by Heron-Allen and Earland to this species from the east coast of Africa may belong[21] it would be interesting to know.

This species is best developed at *Albatross* D5236, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.), off Mindanao, and D5201 in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte. It is worth noting that the *Challenger* material off Tahiti was from depths of 420 and 620 fathoms (768 and 1,134 meters), while the Mediterranean records are from less than 100 fathoms (183 meters).

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[1] Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 54 (No. 16), 1910, pl. 3, figs. 11*a*–*c*.

[2] Trans. Zool. Soc. London, vol 20, 1915, p. 696.

*Discorbis, species (?)—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s., m.... | |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | |

### Genus CYMBALOPORA Hagenow, 1850.

#### CYMBALOPORA POEYI (d'Orbigny).

Plate 59, figs. 2*a–c*.

*Rotalia squammosa* D'ORBIGNY (*nomen nudum*), Ann. Sci. Nat., vol. 7, 1826, 272, No. 8.

*Rosalina poeyi* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Fo aminifères," p. 92, pl. 3, figs. 18–20.

*Cymbalopora poeyi* CARPENTER, Introd. Foram., 1862, p. 215, pl. 13, figs. 10–12. H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 636, pl. 102, fi 13*a–c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 24, pl. 10, fig. pl. 14, fig. 5.

The typical form of the species has occurred at a numbe ( stations in the Philippine area and to the south, the depths rangi from 12 to 554 fathoms (22 to 1,012 meters), average depth 318 fatho (582 meters), and the bottom temperatures from 44.3° F. to 63.1° (6.8° C. to 17.2° C.). The most of the stations are in the Archipela proper, but it was also obtained from station D5590, in 310 fatho (567 meters), bottom temperature 44.3° F. (6.8° C.) in Sibuko B Borneo.

*Cymbalopora poeyi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11922 | U.S.N.M. | 1 | D5156... | 5 12 55 N.; 119 55 55 E.. | 18 | ....... | fne. s., sh.... | Rare. |
| | | 1 | D5160... | 5 12 40 N.; 119 55 10 E.. | 12 | ....... | s............ | Rare. |
| 11921 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E.. | 82 | ....... | gn. s........ | Rare. |
| 11920 | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| 11918 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p........ | Rare. |
| 11919 | U.S.N.M. | 2 | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m........ | Rare. |
| 11917 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| | | 1 | D5460... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Rare. |
| 11743 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Rare. |

#### CYMBALOPORA POEYI (d'Orbigny), var. BRADYI Cushman.

*Cymbalopora poeyi*, var. H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vo 1884, p. 637, pl. 102, fig. 14.

*Cymbalopora poeyi* (d'Orbigny), var. *bradyi* CUSHMAN, Bull. 71, U. S. Nat. pt. 5, 1915, p. 25, pl. 10, fig. 2; pl. 14, fig. 2.

This variety differs from the typical form of the species in its m more compressed form and the much more open arrangement the chambers on the ventral side.

Specimens of this very distinct variety were obtained at four hilippine stations: *Albatross* D5164, in 18 fathoms (33 meters), lu Archipelago; D5191, in 258 fathoms (471 meters,) Tanon Strait, st coast of Negros Island, bottom temperature 62.8° F. (17.1° C.); 5217, in 105 fathoms (193 meters), between Burias and Luzon, ottom temperature 63.1° F. (17.2° C.); and D5348, in 375 fathoms 86 meters), Palawan Passage, bottom temperature 56.4° F. (13.5° ). The other North Pacific record is the type station in 392 fathoms 7 meters), off the Hawaiian Islands.

*Cymbalopora poeyi*, var. *braydi*—*Material examined.*

| | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | U.S.N.M. | 2 | D5164... | 5 01 40 N.; 119 52 20 E.. | 18 | ....... | gn. m....... | Rare. |
| | U.S.N.M. | 1 | D5191... | 10 29 45 N.; 123 31 15 E.. | 258 | 62.8 | gn. m....... | Rare. |
| | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| | U.S.N.M. | 3 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s....... | Few. |

## Genus TRETOMPHALUS Moebius, 1880.

### TRETOMPHALUS BULLOIDES (d'Orbigny).

Plate 59, figs. 3*a*–*c*.

*Rosalina bulloides* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 104, pl. 3, figs. 2–5.

*Cymbalopora bulloides* CARPENTER, Introd. Foram., 1862, p. 216.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 638, pl. 102, figs. 7–12, text figs. 20*a*–*c*.—EARLAND, Journ. Quekett Micr. Club, ser. 2, vol. 8, 1902, pp. 309–322, pl. 16.

*Tretomphalus bulloides* MOEBIUS, Beitr. Meeresfauna Insel. Mauritius, 1880, p. 98, pl. 10, figs. 6–9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 26, pl. 14, figs. 3, 4, text figs. 29*a*–*c*.

This is a pelagic species, at least in part, and its distribution by depth may or may not have a definite significance compared with a truly bottom-living species. It has occurred at six stations in the area—D5192, in 32 fathoms (59 meters), off northern Cebu Island; D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.); D5243, in 218 fathoms (399 meters), Pujada Bay, bottom temperature 63.6° F. (17.5° C.); D5257, off southern Mindanao, eastern Illana Bay; D5551, in 193 fathoms (353 meters), vicinity of Jolo Island, bottom temperature 53.3° F. (11.8° C.); and D5576, in 277 fathoms (506 meters), north of Tawi Tawi, bottom temperature 53.3° F. (11.8° C.).

In the *Challenger* Report Brady records this species as pelagic at Zamboanga, Philippine Islands. In the North Pacific it also occurs about the Hawaiian Islands and about Laysan.

Earland has shown the complicated structure of this species and the peculiar adaptation of the "float chamber." It is found in enormous numbers at certain times from the observations of several collectors. Records show that it is well scattered through the Indo-Pacific region, eastward to the Hawaiian Islands, south to Australia, and west to the coast of Africa. It is also recorded from the Mediterranean and from the West Indies.

*Tretomphalus bulloides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15749 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| 14813 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 404 | 41.2 | fne. gy. s.... | Rare. |
| | | | D5243... | 6 50 55 N.; 126 14 35 E... | 218 | 63.6 | gy. m....... | |
| 15750 | U.S.N.M. | 1 | D5257... | 7 22 12 N.; 124 12 15 E... | 28 | ....... | m............ | Rare. |
| 11924 | U.S.N.M. | 1 | D5551... | 5 54 48 N.; 120 44 24 E... | 198 | 53.3 | fne. s........ | Rare. |
| | | | D5576... | 5 25 56 N.; 120 03 30 E... | 277 | 53.3 | s............ | |

### Genus PLANORBULINA d'Orbigny, 1826.

#### PLANORBULINA LARVATA Parker and Jones.

*Planorbulina vulgaris* d'Orbigny, var. *larvata* Parker and Jones, Ann. Mag Nat. Hist., ser. 3, vol. 5, 1860, p. 294.

*Planorbulina larvata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 37 pl. 19, figs. 3*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 188 p. 658, pl. 92, figs. 5, 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, 27, pl. 8, fig. 2.

This species seems to be very clearly a tropical one, and is, as migh be expected, a very characteristic species of the Philippine Archi pelago, especially in comparatively shallow waters. Outside th Archipelago proper it was noted in the material from the Gulf o Boni; Buton Strait; Sibuko Bay and Darvel Bay, Borneo. The numerous stations from the Archipelago give it a rather general distribution among the islands. The depths range from 17 to 805 fathoms (31 to 1,472 meters), with the average depth 177 fathom (324 meters). Bottom temperatures where given range from 38.3 to 58.6° F. (3.5° to 14.7° C.), with the average 49° F. (9.5° C.) These temperatures are really too low, as the bottom temperature are not given in many cases from the shallow-water stations.

From the great mass of material available it would seem as though this species clearly displaced *P. mediterranensis* in the Philippin region, as this latter species was not found at all.

*Planorbulina larvata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1547 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N. 15° W., 0.30 mile. | 26 | ....... | gn. m., s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Common. |
| [illegible] | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 73 | ....... | fne. s........ | Common. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Common. |
| 1554 | U.S.N.M. | 10+ | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Common. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s... | Common. |
| 1541<br>[illegible] | U.S.N.M. | 5<br>4 | D5276... | 13 40 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Common. |
| 1548 | U.S.N.M. | 6 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Common. |
| 1551 | U.S.N.M. | 7 | D5336... | 11 37 45 N.; 119 46 00 E... | 46 | ....... | s., m........ | Common. |
| 1550 | U.S.N.M. | 8 | D5361... | 13 14 15 N.; 122 44 45 E... | 83 | ....... | co. s......... | Common. |
| 1549 | U.S.N.M. | 5 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............ | Few. |
| [illegible] | U.S.N.M. | 5 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co.... | Few. |
| [illegible] | U.S.N.M. | 3 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Common. |
| [illegible] | U.S.N.M. | 4 | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne. gy. s.... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Common. |
| 1544 | U.S.N.M. | 3 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | .............. | Rare. |
| [illegible] | U.S.N.M. | 3 | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Rare. |

### PLANORBULINA ACERVALIS H. B. Brady.

*Planorbulina acervalis* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 657, pl. 92, fig. 4.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 328, pl. 72, fig. 7.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 29, pl. 14, fig. 3.

Compared with *P. larvata* this species is rare, being found at but few stations and then represented by very few specimens. It occurred at the following stations: D5191, in 258 fathoms (472 meters), Tañon Strait, east coast of Negros, bottom temperature 62.8° F. (17.1° C.); D5255, in 100 fathoms (183 meters), Gulf of Davao; D5419, in 175 fathoms (320 meters), between Cebu and Bohol, bottom temperature 54.5° F. (12.5° C.); D5469, in 500 fathoms (914 meters), east coast of Luzon; and D5546, in 138 fathoms (252 meters), near Jolo Island, bottom temperature 58.3° F. (14.6° C.).

Brady's notes in regard to the distribution of this species contains the following sentence:

> They frequent shallow water, and are most plentiful on bottoms of less than 20 or 30 fathoms (37 or 55 meters), but are sometimes found at much greater depths.

The Philippine material seemed to be represented in the shallow water almost entirely by *P. larvata*, and the few records for *P. acervalis* are all from comparatively deep waters.

*Planorbulina acervalis*.—*Material examined*.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 11959<br>11960 | U.S.N.M. | 2 | D5191... | 10 29 45 N.; 123 31 15 E... | 288 | 62.8 | gn. m....... | Rare. |
| 11962 | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m....... | Rare. |
| 11961 | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m....... | Rare. |
| 11963 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | Rare. |
| 14112 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E... | 138 | 58.3 | fne. co. s.... | Rare. |

## Genus TRUNCATULINA d'Orbigny, 1826.

### TRUNCATULINA REFULGENS (Montfort).

Plate 63, figs. 1*a*–*c*.

"Hammonia *Balanus* seu Balanoidea" SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 58, pl. 46, figs. *nn*, *oo*.

*Cibicides refulgens* MONTFORT, Conch. Syst., vol. 1, 1808, p. 122.

*Truncatulina refulgens* d'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 279, pl. 13, figs. 8–11; Modèles, 1826, No. 77.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 659, pl. 92, figs. 7–9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 30, pl. 12, fig. 2, text fig. 33.

Typical specimens of this species were obtained in material from numerous stations, ranging in depth from 32 to 901 fathoms (59 to 1,648 meters), the average depth being 268 fathoms (491 meters); bottom temperatures range from 38.2° to 75.7° F. (3.4° to 24.2° C.), the average being 54.1° F. (12.2° C.).

These stations cover a wide area in the Archipelago—off southern Luzon; off Jolo; off Romblon; off northern Cebu; Sogod Bay southern Leyte; between Burias and Luzon; east coast of Mindanao Verde Island Passage; between Masbate and Leyte; between Negros and Siquijor; north of Tawi Tawi and outside to the southward off Darvel Bay, Borneo; between Gillolo and Makyan Islands; and in Macassar Strait.

*Truncatulina refulgens*.—*Material examined*.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 13218 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m....... | Rare. |
| 14792 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.6 | dk. gy. m... | Rare. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | Rare. |
| 14794 | U.S.N,M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Rare. |
| | | | D5192 .. | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Rare. |
| 14793 | U.S.N.M. | 6 | D5268... | 13 42 00 N.; 120 58 25 E... | 170 | ....... | p., s., sh..... | Few. |
| 15720 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |
| | | | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 14790 | U.S.N.M. | 2 | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p..... | Rare. |
| | | | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Rare. |
| 14791 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Rare. |
| | | | D5217... | 13 00 20 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s..... | Rare. |
| 14893 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 28 20 E... | 286 | 53.3 | gn. m., s.... | Rare. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s.... | Rare. |
| 14890 | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E... | 340 | ....... | .............. | Rare. |
| | | 1 | D5398... | 11 35 12 N.; 124 13 48 E... | 114 | ....... | gn. m....... | Rare. |
| 14891 | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. and bk. s. | Rare. |
| | | 1 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh........ | Rare. |
| 14773 | U.S.N.M. | 1 | D5623... | 0 16 30 N.; 127 30 00 E... | 272 | ....... | fne. s., m.... | Rare |
| | | 1 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s. ........... | Rare. |
| 14774 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m........ | Rare. |
| | | 1 | D5588... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |
| 15832 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E... | 138 | 58.3 | fne. co. s..... | Rare. |

### TRUNCATULINA LOBATULA (Walker and Jacob).

Plate 63, figs. 2*a*–*c*.

"Nautilus spiralis lobatus, etc." WALKER and BOYS, Test. Min., 1784, p. 20, pl. 3, fig. 71.

"Hammoniae tuberculatae, etc." SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, p. 58, pl. 45, figs. *ii*, *kk*, *ll*, *mm*.

*Nautilus lobatulus* WALKER and JACOB, Adam's Essays, Kanmacher's ed., 1798, p. 642, pl. 14, fig. 36.

*Serpula lobatula* MONTAGU, Test. Brit., 1803, p. 515, Suppl., p. 160.

*Truncatulina lobatula* D'ORBIGNY, in Barker, Webb, and Berthelot, Hist. Nat. Isles Canaries, vol. 2, pt. 2, "Foraminifères," 1839, p. 134, pl. 2, figs. 22–24.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 660, pl. 92, fig. 10; pl. 93, figs. 1, 4, 5; pl. 95, figs. 4, 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 31, pl. 15, fig. 1, text fig. 34.

The occurrence of this species in the Philippine material seems to indicate that it is not common in warm waters compared to its abundance in cooler shallow waters. It is worthy of note that the bottom temperatures of the Philippine stations at which this species occurred and where temperatures are given range from 41.2° to 44.3° F. (5.1° to 6.8° C.), which for this material are decidedly low temperatures. The depths range from 20 to 750 fathoms (37 to 1,370 meters), with the average 282 fathoms. In the Archipelago the species occurred near Basilan Island, in the Sulu Archipelago; vicinity of Jolo; off northern Cebu; and east coast of Mindanao. Except at the last locality, where it was frequent, the species is comparatively few in numbers. To the southward it occurred at a few stations off Sibukó Bay, Borneo; Gulf of Tomini, Celebes; and Flores Sea.

*Truncatulina lobatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 3 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s.......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s.......... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Common. |
| [illegible] | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s.......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s..... | Rare. |

### TRUNCATULINA TENUIMARGO H. B. Brady.

*Truncatulina tenuimargo* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 62, pl. 93, figs. 2, 3.—EGGER, Abh. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 379, pl. 16, figs. 7–9.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 257, pl. 6, figs. 20 and 21.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 102.

This interesting species, which is now known from several stations in the Indo-Pacific, has occurred at two Philippine stations—D5201, Sogod Bay, southern Leyte, 554 fathoms (1,012 meters), and D5277, China Sea, off southern Luzon, 80 fathoms (146 meters).

These are the usual flattish form figured by Brady. None of the specimens are like those figured by Sidebottom.

*Truncatulina tenuimargo—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15727 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| 15728 | U.S.N.M. | 2 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 59.6 | fne. s., m.... | Rare. |

### TRUNCATULINA VARIABILIS d'Orbigny.

Plate 65, fig. 2.

"Testae hammoniformes, *plano-cochleatae, tuberosae articulatae*, etc." SOLDANI, Testaceographia, vol. 1, pt. 1, 1789, pp. 77–80, pls. 70–92.

*Truncatulina variabilis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 279, No. 8 in Barker, Webb, and Berthelot, Hist. Nat. Iles Canaries, vol. 2, pt. 2, "Foraminifères," 1839, p. 135, pl. 2, fig. 29.—H. B. BRADY, Rep. Voy. *Challenger* Zoology, vol. 9, 1884, p. 661, pl. 93, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 33, text fig. 35.

Rare specimens referable to this species were obtained at the following stations: D5110, in 135 fathoms (247 meters), China Sea off southern Luzon, bottom temperature 59° F. (15° C.); D5212, in 108 fathoms (198 meters), east of Masbate Island, bottom temperature 59.9° F. (15.5° C.); D5217, in 105 fathoms (193 meters), between Burias and Luzon, bottom temperature 63.1° F. (17.2° C.); D5272, China Sea off southern Luzon, 118 fathoms (203 meters); and D5546, in 138 fathoms (252 meters), vicinity of Jolo Island, bottom temperature 58.3° F. (14.6° C.).

*Truncatulina variabilis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | |
| 14419 | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m.... | Rare. |
| 14418 | U.S.N.M. | 1 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| 14417 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 58.3 | fne. co. s.... | Rare. |
| 15736 | U.S.N.M. | 2 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Rare. |

### TRUNCATULINA WUELLERSTORFI (Schwager).

Plate 64, figs. 1*a–c*.

*Anomalina wuellerstorfi* SCHWAGER, *Novara*-Exped., geol. Theil., vol. 2, 1866, p. 258, pl. 7, figs. 105, 107.

*Truncatulina wuellerstorfi* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 662, pl. 93, figs. 8, 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 34, pl. 12, fig. 3, text fig. 36.

Throughout the region, both in the Archipelago and in the region to the south, this species occurs, but usually is represented by but few specimens at any station. The stations range in depth from 88 to 1,560 fathoms (161 to 2,853 meters), with the average depth 490 fathoms (897 meters), and the bottom temperatures from 39.2° to 56.4° F. (4° to 13.5° C.), the average being 46.8° F. (8.2° C.).

In the region to the southward of the Archipelago proper the species occurs in Sibuko Bay, Borneo; Gulf of Tomini; Molucca Passage; south of Bouro Island; Molucca Sea; Gulf of Boni; Flores Sea; and Macassar Strait.

*Truncatulina wuellerstorfi*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 8 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Common. |
| [illegible] | U.S.N.M. | 3 | D5222... | 3 36 30 N.; 121 42 45 E... | 195 | 52.8 | gn. m........ | Few. |
| [illegible] | U.S.N.M. | 2 | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ........ | s., m.......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ........ | crs. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s ........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | Co., s ........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5465... | 13 30 42 N.; 123 40 30 E... | 500 | ........ | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 3 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Rare. |
| [illegible] | U.S.N.M. | | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ........ | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m........ | Rare. |

### TRUNCATULINA HAIDINGERII (d'Orbigny).

Plate 64, figs. 3*a*–*c*.

*Rotalina haidingerii* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 154, pl. 8, figs. 7–9.

*Planorbulina haidingerii* H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 469, pl. 48, fig. 11.

*Truncatulina haidingerii* REUSS, Sitz. kais. Akad. Wiss. Wien, vol. 55, 1867, p. 28.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 663, pl. 95, figs. 7*a*–*c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 35, pl. 13, fig. 5; pl. 28, fig. 1, text fig. 37.

This species has been noted at but few stations, all but one (Darvel Bay, Borneo, D5580) in the Archipelago proper. In depth these stations range from 23 to 334 fathoms (42 to 611 meters), the average depth being 193 fathoms (353 meters). Bottom temperatures range from 50.5° to 63.1° F. (10.2° to 17.2° C.).

The stations at which this occurs are near Jolo, D5145; between Burias and Luzon, D5216, 5217; Verde Island Passage and Batangas Bay, D5268, 5269; China Sea, D5301; east coast of Luzon, D5446; and north of Tawi Tawi, D5572.

At nearly all the stations several specimens occurred, and at one or two the species was frequent.

*Truncatulina haidingerii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | Co., s., sh.... | |
| | | | D5216... | 12 52 00 N.; 123 23 30 E... | 215 | 51.9 | gn. m........ | |
| 14814 | U.S.N.M. | 4 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Few. |
| 14818 | U.S.N.M. | 5 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Few. |
| 14421 | U.S.N.M. | 4 | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p.... | Few. |
| 14815 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m........ | Rare. |
| | | | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | |
| | | | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | |
| 14422 | U.S.N.M. | 3 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Few. |

### TRUNCATULINA AKNERIANA (d'Orbigny).

Plate 63, figs. 3*a–c*.

*Rotalina akneriana* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 156, pl. 8, figs. 13–15.
*Truncatulina akneriana* REUSS, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. 160. No. 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 663, pl, 94, figs. 8*a–c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 35, pl. 16. fig. 3, text fig. 38.

Specimens referable to this species were obtained in material from but three stations, D5138, in 380 fathoms (700 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 43° F. (6.1° C.); D5268, 170 fathoms (311 meters), Verde Island Passage; and D5445, east coast of Luzon, 383 fathoms (699 meters), bottom temperature 44.3° F. (6.8° C.).

In the North Pacific material this species occurred only from the Hawaiian Islands. Apparently it is not common as far as the North Pacific is concerned.

*Truncatulina akneriana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14423 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E... | 380 | 43.0 | s., Co........ | Rare. |
| 14425 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |
| 15352 | U.S.N.M. | 3 | | | | | | |
| 14424 | U.S.N.M. | 2 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s..... | Rare. |

### TRUNCATULINA UNGERIANA (d'Orbigny).

Plate 65, figs. 3*a–c*.

*Rotalina ungeriana* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 157, pl. 8, figs. 16–18.

*Planorbulina ungeriana* H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 469, pl. 48, fig. 12.

*Truncatulina ungeriana* REUSS, Denkschr. Akad. Wiss. Wien, vol. 25, 1865, p. 161.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 664, pl. 94, figs. 9*a–d*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 36, pl. 17, fig. 2, text fig. 39.

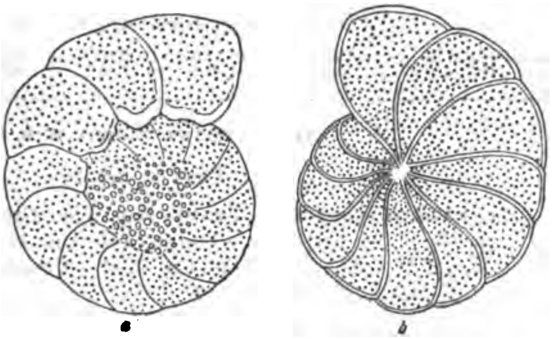

FIG. 12.—TRUNCATULINA UNGERIANA, VAR. ORNATA, NEW VARIETY. × 100. *a*, DORSAL VIEW; *b*, VENTRAL VIEW. FROM STATION D5623.

This species seems to be well distributed both in the Archipelago and in the region to the south. The stations range in depth from 24 to 834 fathoms (44 to 525 meters), the average depth being 422 fathoms (775 meters). The bottom temperatures range from 41.2° to 73.8° F. (5.1° to 23.2° C.), with the average 57.5° F. (14.2° C.).

*Truncatulina ungeriana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 1479 | U.S.N.M. | 7 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Few. |
| 14780 | U.S.N.M. | 5 | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............ | Few. |
| 14781 | U.S.N.M. | 1 | D5606... | 0 16 28 N.; 121 33 30 E... | 834 | ....... | gn. m ....... | Rare. |
| 14420 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s. brk. sh.... | Rare. |
| 14910 | U.S.N.M. | 3 | Nero 840. | 15 16 00 N.; 121 40 00 E... | 737 | ....... | gn. m....... | Rare. |

### TRUNCATULINA UNGERIANA (d'Orbigny), var. ORNATA, new variety.

*Description.*—Variety differing from the typical in the thickened character of the sutures and the periphery, causing a raised ornamentation.

*Distribution.*—Type specimen (Cat. No. 15723, U.S.N.M.) from *Albatross* station D5623, between Gillolo and Makyan Islands, in 272 fathoms (498 meters).

Specimens also occur at the neighboring stations, D5622, in 275 fathoms (503 meters), and D5537, between Negros and Siquijor, in 254 fathoms (465 meters) and two others.

*Truncatulina ungeriana*, var. *ornata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ″ ′ | | °F. | | |
| 15724 | U.S.N.M. | 3 | D5112... | 13 48 22 N.; 120 47 25..... | 159 | ....... | dk. gn. m... | Few. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | |
| | | | D5622... | Makyan Island (NE.), N., 66° W. | 275 | ....... | fne. s., m.... | |
| 15723 | U.S.N.M. | 1 | D5623... | 0 16 30 N.; 127 30 00 E... | 272 | ....... | fne. s., m.... | Rare. |
| 15725 | U.S.N.M. | 3 | D5666... | 2 54 30 S.; 118 47 00 E... | 367 | 41.7 | gy. s., m.... | Few. |

### TRUNCATULINA TENERA H. B. Brady.

Plate 64, figs. 2*a–c*.

*Truncatulina tenera* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol 9, 1884, p. 665, pl. 95, figs. 11*a–c*.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 402, pl. 16, figs. 45–47.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 37, pl. 15, fig. 2.

Single specimens have occurred at the following five stations: D5215, in 604 fathoms (1,105 meters), east of Masbate Island, bottom temperature 50.5° F. (10.2° C.); D5216, in 215 fathoms (393 meters), between Burias and Luzon, bottom temperature 51.9° F. (11° C.); D5348, in 375 fathoms (686 meters), Palawan Passage, bottom temperature 56.4° F. (13.5° C.); D5612, in 750 fathoms (1,370 meters), and D5613, in 752 fathoms (1,375 meters), both in the Gulf of Tomini, Celebes.

The specimens are typical. The only other North Pacific record for the species is off Japan.

*Truncatulina tenera*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | 1 | D5215... | 12 31 30 N.; 123 35 24 E... | 604 | 50.5 | gn. m....... | Rare. |
| 14775 | U.S.N.M. | 1 | D5216... | 12 52 00 N.; 123 23 30 E... | 215 | 51.9 | gn. m....... | Rare. |
| 14776 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s........ | Rare. |
| 14777 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Rare. |
| 14778 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Rare. |

### TRUNCATULINA PRAECINCTA (Karrer).

*Rotalia praecincta* Karrer, Sitz. Akad. Wiss. Wien, vol. 58, 1868, p. 189, pl. 5, fig. 7.

*Truncatulina praecincta* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 667, pl. 95, figs. 1–3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 39, pl. 26, fig. 2, text fig. 42.

Brady recorded this species from a *Challenger* station, off the Philippines, in 95 fathoms (174 meters). The other North Pacific stations are from near the Hawaiian Islands and off Japan at one station. In the Philippine material I have had the species from about a hundred stations, mostly within the Archipelago, but it has also occurred in the vicinity of Darvel Bay and Sibuko Bay, Borneo; Molucca Passage; between Gillolo and Kayoa Islands; Buton Strait; and Gulf of Boni.

The whole number of stations range in depth from 6 to 976 fathoms (11 to 1,785 meters), with the average depth 238 fathoms (436 meters). Bottom temperatures range, where given, from 40.1° to 76.3° F. (4.5° to 24.6° C.), with the average 52.7° F. (11.4° C.). This is from about half the stations, the bottom temperatures from the others, usually the shallow-water ones, not being given; therefore the average is probably much too low.

At some of the stations specimens are very abundant and attain a much larger size than in the colder waters. Some of the specimens measured over 2 mm. in diameter. This is the most common species of the genus in this area, and is evidently at home in warm, comparatively shallow waters.

*Truncatulina praecincta—Material examined.*

| Ca N | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15722 | U.S.N.M. | 7 | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s.... | Few. |
| 14735 | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m... | Common. |
| 14737 | U.S.N.M. | 10 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m... | Common. |
| 14734 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 14725 | U.S.N.M. | 10+ | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Common. |
| 14738 | U.S.N.M. | 5 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh | Few. |
| 14730 | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Rare. |
| 15733 | U.S.N.M. | 2 | D5412... | | | | | |
| 14689 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |
| 14988 | U.S.N.M. | 10+ | D5528... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............... | Common. |
| 15734 | U.S.N.M. | 6 | D5537... | | | | | |
| 14987 | U.S.N.M. | 10+ | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52 | fne. s........ | Common. |
| 14797 | U.S.N.M. | 2 | D5579... | 4 54 15 N.; 119 09 52 E.. | 175 | 55.3 | co. s......... | Rare. |
| 14920 | U.S.N.M. | 5 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Few. |
| 14796 | U.S.N.M. | 10+ | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m....... | Common. |
| 14795 | U.S.N.M. | 1 | D5650... | 4 33 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |

### TRUNCATULINA MARGARITIFERA H. B. Brady.

Plate 65, figs. 1*a*–*c*; plate 74, figs. 1*a*–*c*.

*Truncatulina margaritifera* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 66; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 667, pl. 96, figs. 2*a*–*c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 40, pl. 17, fig. 1, text fig. 43.

Brady records this species from 95 fathoms (174 meters) in material dredged by the *Challenger* in the Philippines. Except for two stations from the southern end of Japan these are the only North Pacific records.

It is interesting to note that the species has occurred frequently in the Philippine region, but all the recorded stations are from the Archipelago proper, except two stations off Darvel Bay, Borneo, from each of which single specimens were obtained. The stations range in depth from 25 to 241 fathoms (46 to 441 meters), with the average 93 fathoms (167 meters) and the bottom temperatures were given from 51.3° to 76.3° F. (10.7° to 24.6° C.), with the average 57.1° F. (13.9° C.).

At two stations—D5133 in 38 fathoms (70 meters), Sulu Sea, off western Mindanao, and D5220 in 50 fathoms (91 meters), between Marinduque and Luzon—it was abundant. At other stations it was frequent or represented by few specimens.

Specimens seem to be rather larger than the measurements given for this species, running up to over 2 mm. in well-developed specimens.

This is a very strikingly ornamented species, of large size, and excellently figured by Brady. For that reason the lack of records is significant. Brady's original records were from off the Philippines in 95 fathoms (174 meters); off the New Hebrides, 125 fathoms (229 meters); and the coast of Korea, 10 to 50 fathoms (18 to 91 meters). In the North Pacific work I added two records for the species off Japan in 66 and 39 fathoms (121 and 71 meters). The Philippine records complete what is known of its distribution.

It is not recorded by Millett from the Malay Archipelago, by Dakin from Ceylon, by Heron-Allen and Earland from Kerimba, by any writers from Australia, nor by Egger from any of his material.

Its fine development in the Philippines shows that it is a characteristic species, and we must come to the conclusion that it is a species of comparatively limited distribution.

*Truncatulina margaritifera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14897 | U.S.N.M. | 4 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s......... | Few. |
| 14899 | U.S.N.M. | 1 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s......... | Rare. |
| 14898 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Common. |
| 14901 | U.S.N.M. | 7 | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s.... | Common. |
| 14900 | U.S.N.M. | 10+ | D5213... | 12 15 00 N.; 123 57 30 E.. | 80 | ....... | s., m., sh ... | Common. |
| 14798 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Common. |
| 14799<br>14800<br>14426 | U.S.N.M. | 10+ | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............. | Common. |
| | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co., s., m.... | Rare. |
| 14801 | U.S.N.M. | 3 | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh.... | Few. |
| 14802 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 15735 | U.S.N.M. | 3 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh....... | Few. |

### TRUNCATULINA CULTER (Parker and Jones).

Plate 62, figs. 4*a–c*.

*Planorbulina culter* PARKER and JONES, Philos. Trans., 1865, vol. 155, pl. 27, figs. 1, *a*, *b*.

*Anomalina bengalensis* SCHWAGER, *Novara*-Exped., geol. Theil, vol. 2, 1866, p. 259, pl. 7, fig. 3.

*Truncatulina culter* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 668, pl. 96, figs. 3, *a*, *b*, *c*.

The only record for this species is a specimen from *Albatross* station D5638, off Bouro Island, in 517 fathoms (946 meters). It is very typical.

*Truncatulina culter—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5638... | 3° 47′ 15″ S.; 126° 28′ 40″ E.. | 517 | °F. ....... | fne. gy. s.... | Rare. |

## TRUNCATULINA HUMILIS H. B. Brady.

*Truncatulina humilis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 665, pl. 94, figs. 7, *a*, *b*, *c*.

There are a few specimens from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

These seem to be the same as the specimens figured by Brady, but are much larger than the measurements given by him.

*Truncatulina humilis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 3 | D5236... | 8° 50′ 45″ N.; 126° 26′ 52″ E.... | 494 | °F. 41.2 | fne. gy. s.... | Few. |

## TRUNCATULINA ROSTRATA H. B. Brady.

*Truncatulina rostrata* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 65; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 668, pl. 94, figs. 6*a–c*.

There are three specimens of this rare species described by Brady from the *Challenger* material, off the northern shores of New Guinea in Humboldt Bay, 37 fathoms (68 meters), and near the Admiralty Islands in 16 to 25 fathoms (29 to 46 meters); also off Tongatabu, Friendly Islands, in 18 fathoms (33 meters). The Philippine material is from *Albatross* station D5218, between Burias and Luzon, in 20 fathoms (37 meters). These specimens are typical.

*Truncatulina rostrata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 15730 | U.S.N.M. | 3 | D5218... | 13° 11′ 15″ N.; 123° 02′ 45″ E... | 20 | °F. ....... | crs. s........ | Rare. |

## Genus SIPHONINA Reuss, 1849.

### SIPHONINA RETICULATA (Czjzek).

Plate 60, figs. 3*a–c*.

*Rotalina reticulata* Czjzek, Haidinger's Nat. Abh., vol. 2, 1848, p. 145, pl. 13, figs. 7–9.

*Siphonina reticulata* Bronn, Lethaea Geognostica, ed. 3, 1853–1856, p. 227, pl. 35 (?), figs. 23*a–c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 43, pl. 16, fig. 4; pl. 28, fig. 3, text fig. 48.

*Truncatulina reticulata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 669, pl. 96, figs. 5–8.

The only records for this species are D5120, 393 fathoms (719 meters), Verde Island Passage; D5217, 105 fathoms (193 meters), between Burias and Luzon; and D5242, 191 fathoms (350 meters), Pujada Bay. The only other North Pacific records I have had are from two *Albatross* stations off Japan.

*Siphonina reticulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 14822 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s.... | Rare. |
| 15715 | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Rare. |
| 15716 | U.S.N.M. | 1 | D5242... | 6 51 53 N.; 126 14 10 E... | 191 | 64.1 | sft. gy. m.... | Rare. |

## Genus ANOMALINA d'Orbigny, 1826.

### ANOMALINA ARIMINENSIS (d'Orbigny).

*Planulina ariminensis* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 280, pl. 14, figs. 1–3; Modèles, 1826, No. 49.

*Anomalina ariminensis* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 674, pl. 93, figs. 10, 11.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 335, pl. 79, fig. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 44, pl. 19, fig. 1, text figs. 49*a–c*.

Apparently this is a very rare species in this region, its occurrence having been noted but twice in all the material examined—D5192, in 32 fathoms (59 meters), off northern Cebu Island, and D5268, in 170 fathoms (311 meters), Verde Island Passage. The bottom temperature is not given in either case.

*Anomalina ariminensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 14414 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Rare. |
| 14413 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | p., s., sh .... | Rare. |

### ANOMALINA GROSSERUGOSA (Gümbel).

Plate 62, fig. 3.

*Truncatulina grosserugosa* GÜMBEL, Abh. kais. bay. Akad. Wiss., vol. 10, 1868, p. 660, pl. 2, fig. 104.

*Anomalina grosserugosa* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 673, pl. 94, figs. 4, 5.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 335, pl. 78, fig. 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 45, pl. 20, fig. 1.

Although occurring at the largest number of stations in the region this species is not so abundant in point of numbers as is *A. polymorpha*. *A. grosserugosa* occurs at a large number of stations, nearly half of which are in the region to the south, including Sibuko Bay, Borneo; Gulf of Tomini, Celebes; between Gillolo and Makyan Islands; south of Bouro Island; Gulf of Boni; Flores Sea; and Macassar Strait. In the Archipelago proper the depths are somewhat less. Taking in all the stations in the whole area the range in depth is from 17 to 765 fathoms (31 to 1,399 meters), with the average 335 fathoms (613 meters). The bottom temperature ranges from 39.2° to 75.7° F. (4° to 24.2° C.), average 50. 4° F. (10.2° C.).

*Anomalina grosserugosa—Material examined.*

| [illegible] | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | °F. | | |
| U.S.N.M. | 1 | D5172... | 60 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh... | Rare. |
| U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| U.S.N.M. | 5 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Few. |
| U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| U.S.N.M. | 4 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Few. |
| U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Few. |
| U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Few. |
| U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s.... | Few. |
| U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m....... | Few. |

### ANOMALINA AMMONOIDES (Reuss).

Plate 61, figs. 1*a–c*.

*Rosalina ammonoides* REUSS, Geogn. Skizze Böhmen, vol. 2, 1884, p. 214; Verstein böhm. Kreide, vol. 1, 1845–1846, p. 36, pl. 8, fig. 53; pl. 13, fig. 66.

*Planorbulina ammonoides* JONES, Geologist, vol. 6, 1863, p. 294, pl. 15, figs. 7, 8.

*Discorbis ammonoides* REUSS, Sitz. Akad. Wiss. Wien, vol. 52, 1865, p. 456, No. 5.

*Anomalina ammonoides* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 672, pl. 94, figs. 2, 3.—H. B. BRADY, PARKER, and JONES, Trans. Zool. Soc., vol. 12, 1888, p. 228, pl. 45, figs. 20–22.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 335, pl. 78, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 46, pl. 19, fig. 2.

*Anomalina ammonoides* has been noted in the material from 8 stations, all within the Archipelago proper. These stations range in depth from 254 to 805 fathoms (465 to 1,472 meters), the average depth being 387 fathoms (708 meters). Where given, the range in bottom temperature is from 41.2° to 56.4° F. (5.1° to 13.5° C.), the average being 49.3° F. (9.6° C.). At a single station—D5348 in Palawan Passage—it was frequent, occurring at the other stations as scattered or single specimens.

*Anomalina ammonoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11971 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 11970 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| 11968 | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| 11969 | U.S.N.M. | 2 | | | | | | |
| 11965 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 11966 | U.S.N.M. | 4 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Frequent. |
| 11967 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| 11972 | U.S.N.M. | 2 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.2 | gn. m., glob. | Rare. |
| 11973 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Rare. |

### ANOMALINA POLYMORPHA Costa.

Plate 61, figs. 3*a*–*c*.

*Anomalina polymorpha* Costa, Atti Accad. Pont., vol. 7, 1856, p. 252, pl. 2 figs. 7, 9.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 67 pl. 97, figs. 3–7.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 336, pl. 79, fig. 3.–Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 47, pl. 19, figs. 3, 4.

This is the commonest species of the genus in the Philippine region occurring at nearly as many stations as *A. grosserugosa*, and a certain stations being one of the most abundant species in point number of individuals. This is especially true of station D5236, i 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.), o the east coast of Mindanao, where it occurs very abundantly; an again at station D5586, in 347 fathoms (635 meters), bottom temperature 44.0° F. (6.6° C.) in Sibuko Bay, Borneo, where it was common At other stations it occurred as scattered individuals. The station range in depth from 49 to 730 fathoms (90 to 1,335 meters), th average depth being 352 fathoms (644 meters). The bottom temperatures range from 40.1° to 73.8° F. (4.5° to 23.2° C.), the averag being 48.2° F. (8.9° C.).

*Anomalina polymorpha—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11987 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Rare. |
| 11981 | U.S.N.M. | 7 | D5236... | 8 50 45 N.; 126 26 45 E.. | 494 | 41.2 | fne. gy. s..... | Abundant |
| 11989 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s..... | Rare. |
| 11992 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 11990 | U.S.N.M. | 2 | D5333... | 12 26 30 N.; 120 37 45 E.. | 310 | 73.8 | s............ | Rare. |
| 11982 | U.S.N.M. | 2 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m........ | Rare. |
| 11986 | U.S.N.M. | 2 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m........ | Rare. |
| 11991 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | m............ | Rare. |
| 11983 | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.3 | s., sh....... | Rare. |
| 11985 | U.S.N.M. | 1 | D5574... | 5 30 45 N.; 120 07 57 E.. | 340 | ....... | ............ | Rare. |
| 11980 | U.S.N.M. | 4 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Few. |
| 11988 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Rare. |
| 11984 | U.S.N.M. | 4 | D5650... | 4 35 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m........ | Few. |

### ANOMALINA POLYMORPHA Costa, var. CERVICORNIS Cushman.

Plate 62, figs. 1a, b.

*Anomalina polymorpha*, var. *cervicornis* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 662.

*Description.*—Test differing from the typical by having a marginal crown of short, stout, more or less branching or bifid spines on the ngular margin of the chamber.

*Distribution.*—Type specimen (U.S.N.M. No. 14415) from *Albatross* tation D5236, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.), Pacific Ocean, east coast of Mindanao.

This variety shows a rather remarkable departure from the usual rnamentation of the species.

*Anomalina polymorpha*, var. *cervicornis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| [illegible] | U.S.N.M. | 1 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.. | 494 | °F.<br>41.2 | fne.gy.s..... | Rare. |

### ANOMALINA POLYMORPHA Costa, var. SIPHONIFERA, Cushman.

Plate 62, figs. 2a, b.

*Anomalina polymorpha*, var. *siphonifera* CUSHMAN, Proc. U. S. Nat. Mus., vol. 51, 1917, p. 662.

*Description.*—Test differing from the typical by having short, tubular projections from the exterior, rather indefinitely placed; wall otherwise smooth.

*Distribution.*—Type specimen (U.S.N.M. No. 14416) from *Albatross* station D5236, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1°C.), Pacific Ocean, east coast of Mindanao.

This variety is rather unique among this group, reminding one somewhat of the tubulations seen in *Textularia siphonifera*.

*Anomalina polymorpha*, var. *siphonifera*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 14416 | U.S.N.M. | 2 | D5236... | ° ′ ″ ° ′ ″<br>8 50 45 N.; 126 26 52 E.. | 494 | °F.<br>41.2 | fne.gy.s..... | Rare. |

### ANOMALINA CORONATA Parker and Jones.

Plate 61, figs. 2*a–c*.

*Anomalina coronata* Parker and Jones, Ann. Mag. Nat. Hist., ser. 2, vol. 1857, p. 294, pl. 10, figs. 15, 16.—H. B. Brady, Rep. Voy. *Challenger*, Zoolo vol. 9, 1884, p. 675, pl. 97, figs. 1, 2.—Cushman, Bull 71, U. S. Nat. Mus., 5, 1915, p. 47, pl. 18, fig. 5.

Specimens referable to this species occurred at the following s tions: D5236, in 494 fathoms (903 meters), bottom temperatu 41.2° F. (5.1° C.), east coast of Mindanao; D5318, in 340 fatho (622 meters), China Sea vicinity of Formosa; D5445, in 383 fatho (699 meters), bottom temperature 44.3° F. (6.8° C.); and D5446, 300 fathoms (549 meters) east coast of Luzon.

*Anomalina coronata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 11974 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s...... | Few. |
| 11976 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ........ | s., br. Co .... | Rare. |
| 11975 | U.S.N.M. | 2 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s...... | Rare. |
| 11995 | U.S.N.M. | 2 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ........ | gn. m......... | Rare. |

## Genus PULVINULINA Parker and Jones, 1862.

### PULVINULINA REPANDA (Fichtel and Moll).

*Nautilus repandus* Fichtel and Moll, Test. Micr., 1798, p. 35, pl. 3, figs. *a–d*.

*Rotalia repanda* Parker and Jones, Ann. Mag. Nat. Hist., ser. 3, vol. 5, 186 p. 175, No. 25.

*Pulvinulina repanda* Parker and Jones, in Carpenter, Parker, and Jones, Intro Foram., 1862, p. 311.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 1884, p. 684, pl. 104, figs. 18*a–c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 1915, p. 50, pl. 24, fig. 3.

It is interesting to note that in the *Challenger* Report this specie is characterized as a shallow-water species. That seems to be tru usually, but in the Philippines the only specimens which seem refer able to this species are from rather deep water, and it was not foun in the material from less than 100 fathoms (183 meters). The sta tions include the following localities: Verde Island Passage; betwee Burias and Luzon; Pacific Ocean, east coast of Mindanao; Gulf o Davao; north of Tawi Tawi; Sibuko Bay, Borneo; Gulf of Tomini, Celebes; Molucca Sea.

The range in depth of these stations is from 100 to 1,560 fathoms (183 to 2,853 meters); the average depth 461 fathoms (843 meters). Bottom temperatures are not given in all cases, but those that are range from 43.0° to 63.1° F. (6.1° to 17.2° C.), average 50.8° F. (10.4° C.).

*Pulvinulina repanda—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 4 | D5217... | 13 00 20 N.; 123 14 15 E.. | 106 | 63.1 | crs. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............ | Rare. |
| [illegible] | U.S.N.M. | 2 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m........ | Rare. |
| | | 1 | D5238... | 7 34 45 N.; 126 38 15 E.. | 380 | 43.0 | gn. m........ | Rare. |
| | | 1 | D5256... | 7 08 00 N.; 125 39 00 E.. | 100 | ....... | sft. m........ | Rare. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 30 E.. | 277 | 53.3 | s............ | Few. |

### PULVINULINA CONCENTRICA Parker and Jones.

Plate 68, figs. 4*a–c*.

*Pulvinulina concentrica* (Parker and Jones, MS.) H. B. Brady, Trans. Linn. Soc., London, vol. 24, 1864, p. 470, pl. 48, fig. 14.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 686, pl. 105, figs. 1*a–b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 51, pl. 28, fig. 4.

This is a very characteristic species of wide distribution, but usually not occurring in any considerable numbers. The Philippine material is very typical. All of the stations are within the Archipelago proper. They include the following localities: East coast of Luzon; Verde Island Passage; between Burias and Luzon; off Romblon; and numerous stations in the Sulu Sea about Jolo and Tawi Tawi. The range of depth at the stations is from 23 to 500 fathoms (42 to 914 meters), the average depth 204 fathoms (373 meters). Bottom temperatures are given at but five of the numerous stations, as follows: 50.4°, 52.3°, 52.3°, 63.1°, and 75.7° F. (10.2°, 11.2°, 11.2°, 17.2°, and 24.2° C.).

*Pulvinulina concentrica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12890 | U.S.N.M. | 1 | D5146... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh..... | Rare. |
| | | | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh..... | Few. |
| 12887 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Few. |
| 12889 | U.S.N.M. | 8 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Common. |
| | | 1 | D5217... | 13 00 20 N.; 123 14 15 E.. | 106 | 63.1 | crs. gy. s..... | Rare. |
| 12888 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| 12891 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Rare. |
| 14438 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| 11622 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |

### PULVINULINA PUNCTULATA (d'Orbigny).

Plate 68, figs. 1a–c.

*Rotalia punctulata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 273, No. 25; Modèles, 1826, No. 12.

*Pulvinulina repanda*, var. *punctulata* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 394, pl. 14, figs. 12, 13.

*Pulvinulina punctulata* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 20, pl. 3, fig. 82.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 685, pl. 104, figs. 17a–c.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 52, pl. 24, fig. 1, text figs. 54a–c.

Material referable to this species seems to be very rare in the Philippine region, occurring at but five stations: D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast Mindanao, bottom temperature 41.2° F. (5.1° C.); D5296, China Sea, off southern Luzon, 210 fathoms (384 meters); D5333, in 310 fathoms (567 meters), Mindoro Strait, bottom temperature 73.8° F. (23.2° C.); D5478, between Samar and Leyte, 57 fathoms (104 meters); and D5642, in 37 fathoms (68 meters), Buton Strait. Specimens were not frequent at any of the stations.

*Pulvinulina punctulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12376 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| 12375 | U.S.N.M. | 1 | D5333... | 12 26 30 N.; 120 37 45 E.. | 310 | 73.8 | s............ | Rare. |
| 11627 | U.S.N.M. | 1 | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy. m........ | Rare. |
| 15709 | U.S.N.M. | 8 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh........... | Few. |
| 15710 | U.S.N.M. | 1 | D5296... | 13 40 09 N.; 120 57 45 E.. | 210 | ....... | m., s........ | Rare. |

### PULVINULINA CONCAMERATA (Montagu).

*Serpula concamerata* MONTAGU, Test. Brit., Suppl., 1808, p. 160.

*Rotalina concamerata* WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 52, pl. 4, figs. 102, 103.

*Pulvinulina repanda*, var. *concamerata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 685, pl. 104, figs. 19a–c.

*Pulvinulina concamerata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 52, pl. 25, fig. 1.

This rather strikingly ornamented species has occurred at five stations: D5217, east of Masbate Island, 105 fathoms (193 meters); D5238, Pacific Ocean, east coast of Mindanao, 380 fathoms (700 meters); D5255, Gulf of Davao, 100 fathoms (183 meters); D5268, in 170 fathoms (311 meters), Verde Island Passage; and D5481 in 61 fathoms (112 meters), between Samar and Leyte, vicinity of Surigao Strait. Specimens were rare at all these stations.

*Pulvinulina concamerata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5238... | 7 34 45 N.; 126 38 15 E.. | 380 | 43.0 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 126 39 00 E.. | 100 | ....... | sft. m....... | Rare. |
| [illegible] | U.S.N.M. | 8 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Few. |
| | | | D5481... | 10 27 30 N.; 126 17 10 E.. | 61 | ....... | s., sh., Co.... | Rare. |

## PULVINULINA AURICULA (Fichtel and Moll).

Plate 69, figs. 3*a*–*c*.

*Nautilus auricula*, var. *a*, FICHTEL and MOLL, Test. Micr., 1803, p. 108, pl. 20, figs. *a*–*c*.

*Pulvinulina auricula* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 393.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 688, pl. 106, figs. 5*a*–*c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 63, pl. 22, fig. 1.

This species was recorded by Brady off the Philippines in 95 fathoms (174 meters). It is one of the characteristic species in the dredgings from below 100 fathoms (183 meters), the range being 32 to 1,105 fathoms (59 to 2,021 meters), but one station being less than 100 fathoms (183 meters), and the average 331 fathoms (606 meters). Bottom temperatures range from 43.3° to 59.6° F. (6.1° to 15.3° C.), average 50.0° F. (10° C.). The stations include a wide range of localities: China Sea off Formosa and eastern and southern Luzon; between Marinduque and Luzon; off northwestern Panay; off northern Cebu; between Cebu and Bohol; Sogod Bay, southern Leyte; Sulu Sea, off Jolo and Tawi Tawi; off eastern Palawan; and to the south at several stations in Sibuko Bay, Borneo and Macassar Strait. Specimens do not usually occur in very considerable numbers at any of the stations but are large and well-developed.

*Pulvinulina auricula*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Rare. |
| [illegible] | U.S.N.M. | 1 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Few. |
| [illegible] | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E.. | 175 | 54.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5566... | 5 52 12 N.; 120 31 00 E.. | 244 | 52.5 | fne. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 10 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s .... | Common. |
| [illegible] | U.S.N.M. | 1 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Few. |
| [illegible] | U.S.N.M. | 3 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m....... | Few. |

### PULVINULINA OBLONGA (Williamson).

*Rotalina oblonga* Williamson, Recent Foraminifera of Great Britain, 1858, p. 51, pl. 4, figs. 98–100.

*Pulvinulina oblonga* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 688, pl. 106, figs. 4*a–c*.

A specimen which it seems can be referred to this species was found at a single station in the area—D5220, between Marinduque an Luzon, 50 fathoms (91 meters). It was very rare at this statio however.

*Pulvinulina oblonga—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| 15746 | U.S.N.M. | 1 | D5220... | ° ′ ″ 13 38 00 N.; ° ′ ″ 121 58 00 E.. | 50 | °*F.* ....... | sft. gn. m... | Rare. |

### PULVINULINA SCABRA H. B. Brady.

Plate 58, figs. 3*a*, *b*.

*Pulvinulina oblonga* (Williamson), var. *scabra* H. B. Brady, Rep. Voy. *Chal lenger*, Zoology, vol. 9, 1884, p. 689, pl. 106, figs. 8*a–c*.—Cushman, Bull. T U. S. Nat. Mus., pt. 5, 1915, p. 53, pl. 27, fig. 5.

From an examination of a considerable series of this form it seen that it is worthy of specific rank. Typical *P. oblonga* seems to l rare as far as the material I have had shows, although Brady a parently had material from the Philippines in 95 fathoms (17 meters) which he referred to it. On the other hand, *P. scabr* while not frequent, does appear at a number of stations and at son in very considerable numbers. The specimens are very constant i their characters and agree very closely with those of Brady.

Sidebottom refers to specimens from off Cebu,[22] and speaks of th fact that all his specimens showed the earlier chambers to be flat o concave, while in the figures given by Brady they seem to be some what convex. In the Philippine material I have seen they are flat tened and then become convex in later chambers. The ventral sid in one form is very much like that given by Brady, except that it i rather more roughened, and is thereby easily distinguished fron *Discorbis ventricosa*, which occasionally occurs at the same statio In the latter species also the ventral side is much more convex an the umbilical region has a large cavity. The scabrous condition i the two is also very different in its characters.

*Pulvinulina scabra* occurs at stations represented by the followin localities: China Sea, off southern Luzon; between Marinduque an Luzon; off Romblon; and Sulu Sea, off western Mindanao. It wa not found in the region to the south of the Archipelago.

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[22] Mem. and Proc. Manchester Lit. and Philos. Soc., vol. 53, No. 21, 1909, p. 6.

The stations range in depth from 10 to 50 fathoms (18 to 91 meters), the average being 34 fathoms (62 meters). It is therefore in this region a species of comparatively shallow water. Brady's records were 95 fathoms (174 meters), Philippines, and 17 to 155 fathoms (31 to 283 meters) off New Guinea. In the Atlantic, however, Brady records it from much deeper water—435 fathoms (796 meters), off Bermuda, and 1,000 fathoms (1,829 meters) west of the Azores. It will be interesting to see if these are really identical forms in all their characters with the more shallow-water Indo-Pacific species.

*Pulvinulina scabra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 8 | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s., sh. | Common. |
| [illegible] | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co.......... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Few. |
| [illegible] | U.S.N.M. | 5 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Few. |
| [illegible] | U.S.N.M. | 6 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Frequent. |
| [illegible] | U.S.N.M. | 10 | D5229... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Frequent. |

### PULVINULINA PHILIPPINENSIS, new species.

Plate 58, figs. 2*a*–*c*.

*Pulvinulina hauerii* (part) H. B. BRADY (not d'Orbigny 1846), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 690, pl. 106, fig. 7 (not fig. 6).

*Description.*—Test rounded, composed of about three coils, the outer one consisting of five chambers, very rapidly increasing in size, the last-formed chamber in the adult making up nearly half the volume of the test; periphery very broadly rounded; dorsal and ventral sides slightly rounded; sutures distinct, but not deep on the dorsal side, somewhat deeper on the ventral side; slightly umbilicate; wall smooth, very thin, punctate.

Diameter 0.4 to 0.6 mm.

*Distribution.*—Type specimen (Cat. No. 15760, U.S.N.M.) from *Albatross* station D5268, Verde Island Passage, 170 fathoms (311 meters). It also occurs at the following stations: D5178, off Romblon, 78 fathoms (143 meters); D5381, Ragay Gulf, Luzon, 88 fathoms (161 meters); and D5565, between Jolo and Tawi, Tawi, 243 fathoms (445 meters).

Brady refers this species to *P. hauerii* d'Orbigny, but comparison with that figured by Brady shows that the two are very distinct. Brady records it from seven stations in the South Pacific. It is very constant in its characters and seems to be a well-defined species of this general region.

*Pulvinulina philippinensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15761 | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |
| 15760 | U.S.N.M. | 2 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Few. |
| 15712 | U.S.N.M. | 4 | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s......... | Few. |
| 15762 | U.S.N.M. | 2 | D5565... | 5 51 42 N.; 120 30 8 E... | 243 | 52.3 | s., ptr., sh .. | Few. |

### PULVINULINA INDICA, new species.

*Pulvinulina hauerii* H. B. Brady (part) (not d'Orbigny 1846), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 690, pl. 106, fig. 6 (not fig. 7).

*Description.*—Test somewhat longer than broad, composed of about two whorls, the last one having six chambers, usually gradually increasing in length as added; periphery broadly rounded, dorsal side convex, as is also the ventral side; sutures on both sides deeply depressed; ventral side not umbilicate, but the ventral portion of the last-formed chamber having an irregularly oval area of clear shell material; surface smooth, thin, and punctate; aperture a narrow arcuate slit at the edge of the peripheral side of the last-formed chamber.

Diameter 0.50 to 0.75 mm.

*Distribution.*—Type specimen (Cat. No. 15759, U.S.N.M.) from *Albatross* station D5219, between Marinduque and Luzon, in 530 fathoms (969 meters).

There are also specimens from D5134, Sulu Archipelago, near Basilan Island, in 34 fathoms (62 meters); D5143, off Jolo, in 19 fathoms (35 meters); D5145, at a neighboring station, in 23 fathoms (42 meters); and D5178, off Romblon, in 73 fathoms (133 meters).

This species, like the preceding, *P. philippinensis*, is confused by Brady with *P. hauerii* d'Orbigny. A comparison of the places at which these two occur shows that *P. indica* is found in much more shallow water than *P. philippinensis*, and the two do not occur together at the same stations; but they are probably both species characteristic of this general region. Brady's figures of both of these are very careful drawings and show well the characteristics of these two species.

*Pulvinulina indica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15788 | U.S.N.M. | 5 | D5134... | 6 44 12 N.; 121 46 55 E... | 34 | 76.2 | gy. s........ | Few. |
| 15754 | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Rare. |
| 15755 | U.S.N.M. | 3 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Few. |
| 15747 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 73 | ....... | fne. s........ | Rare. |
| 15759 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m....... | Rare. |

### PULVINULINA BERTHELOTIANA d'Orbigny, var. SUBORNATA, new variety.

Plate 70, fig. 1.

*Description.*—Test differing from the typical in the character of the ornamentation, the sutures being thickened on the dorsal side, the periphery with a thickened rim, and basal angle of each chamber with a raised oval development.

*Distribution.*—Type specimen (Cat. No. 15355, U.S.N.M.) from *Albatross* station D5301, China Sea off Hongkong, in 208 fathoms (381 meters).

There are also specimens from nine other stations, ranging in depth from 6 to 208 fathoms (11 to 381 meters), the average being 106 fathoms (194 meters). Bottom temperatures are given at six stations, ranging from 50.5° to 76.3° F. (10.2° to 24.6° C.), the average temperature being 58.9° F. (14.9° C.).

All these stations are in the Archipelago.

*Pulvinulina berthelotiana, var. subornata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1535 | U.S.N.M. | 4 | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Few. |
| 1535 | U.S.N.M. | 8 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh........ | Common. |
| | | | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s.... | Few. |
| | | | D5217... | 13 00 20 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Frequent. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Few. |
| | | | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s., sh., m.... | Few. |
| | | | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m.... | Frequent. |
| | | | D5344... | 10 50 40 N.; 119 22 32 E... | 6 | ....... | m............ | Few. |
| | | | D5398... | 11 35 12 N.; 124 13 48 E... | 114 | ....... | gn. m....... | Few. |
| | | | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m....... | Few. |

### PULVINULINA MENARDII (d'Orbigny).

Plate 66, figs. 1*a*–*c*.

*Rotalia menardii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 273, No. 26; Modèles, 1826, No. 10.

*Pulvinulina menardii* OWEN, Journ. Linn. Soc., London, vol. 9, 1867, p. 148, pl. 5, fig. 6.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, 1884, p. 690, pl. 103, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 54, pl. 22, fig. 2.

This common species of Globigerina-ooze is abundant, being found at more than 100 of the stations examined. As might be expected the species is most common around the outer coasts of the Archipelago, but is also common in the Sulu Sea and found less abundantly in the more protected waters among the islands. To the southward it occurs at nearly all the stations; Darvel and Sibuko Bays, Borneo; Gulf of Tomini, Celebes; Molucca Passage; between Gillolo and Makyan Islands; between Gillolo and Kayoa; south of Patiente Strait; off Bouro Island; Molucca Sea; Buton Strait; Gulf of Boni; Flores Sea; and Macassar Strait.

The depths of these stations range from 15 to 1,560 fathoms (27 to 2,853 meters) with the average 269 fathoms (493 meters), although depth probably means little with a more or less pelagic species. The bottom temperatures are given at but 56 stations, ranging from 36.3° to 75.7° F. (2.3° to 24.2° C.), with the average 51.1° F. (10.6° C.).

*Pulvinulina menardii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12371 | U.S.N.M. | 10+ | D5126 | 10 34 45 N.: 121 47 30 E | 742 | 49.5 | sft. gn. m | Common. |
| 12373 | U.S.N.M. | 8 | D5201 | 10 10 00 N.: 125 04 15 E | 554 | 52.8 | gy. s., m | Few. |
| 12324<br>12896 | U.S.N.M. | 7 | D5286 | 8 50 45 N.: 126 26 52 E | 494 | 41.2 | fne. gy. s | Common. |
| 12331 | U.S.N.M. | 6 | D5281 | 13 52 45 N.: 120 25 00 E | 201 | 50.4 | dk. gy. s | Few. |
| 12330<br>14446 | U.S.N.M. | 5<br>1 | D5300 | 20 31 00 N.: 115 49 00 E | 265 | | gy. m., s | Few. |
| 12329 | U.S.N.M. | 10+ | D5338 | 11 33 45 N.: 119 24 26 E | 43 | | Co., s., m | Common. |
| 12332 | U.S.N.M. | 7 | D5381 | 13 14 15 N.: 122 44 45 E | 88 | | co. s | Common. |
| 11629 | U.S.N.M. | 4 | D5571 | 5 30 45 N.: 120 07 57 E | 340 | 52.3 | s., sh | Few. |
| 14445 | U.S.N.M. | 9 | D5627 | 0 06 00 N.: 127 26 00 E | 22 | | m | Common. |
| 12327<br>12372 | U.S.N.M. | 10+ | D5630 | 0 56 30 S.: 128 05 00 E | 569 | | co. s., m | Common. |
| 12325 | U.S.N.M. | 10 | D5637 | 3 53 20 S.: 126 48 00 E | 700 | | gy. m | Common. |
| 12333<br>14447 | U.S.N.M. | 6<br>1 | D5639 | 3 54 50 S.: 123 27 20 E | 1,560 | | gy. m | Common. |
| 12334 | U.S.N.M. | 8 | D5654 | 3 42 00 S.: 120 45 50 E | 806 | 38.3 | Co., s | Common. |
| 15743 | U.S.N.M. | 1 | D5446 | 12 43 51 N.: 124 59 18 E | 300 | | gn. m | Rare. |
| 15748 | U.S.N.M. | 1 | D5660 | 5 36 30 S.: 120 49 00 E | 692 | 39.2 | gy. m., s | Rare. |
| 15757 | U.S.N.M. | 2 | D5666 | 2 54 30 S.: 118 47 00 E | 272 | 47.5 | gn. m | Rare. |
| | | | D5110 | 13 59 20 S.: 120 75 45 E | 135 | 59.0 | dk. gy. m | Few. |
| | | | D5112 | 13 48 22 N.: 120 47 25 E | 177 | 52.4 | dk. gn. m | Few. |
| | | | D5113 | 13 51 30 N.: 120 50 30 E | | | | |
| | | | D5114 | 13 36 11 N.: 120 45 26 E | 159 | | dk. gn. m | Few. |
| | | | D5115 | 13 37 11 N.: 120 43 40 E | 340 | | fne. s | Few. |
| | | | D5120 | 13 45 30 N.: 120 30 15 E | 340 | | | Frequent. |
| | | | D5121 | 13 27 20 N.: 121 17 45 E | 393 | 43.7 | gn. m., s | Few. |
| | | | D5134 | 6 44 45 N.: 121 48 00 E | 108 | | dk. gn. m | Few. |
| | | | D5153 | 5 18 10 N.: 120 02 55 E | 25 | | fne. s | Few. |
| | | | D5172 | 6 03 15 N.: 120 35 30 E | 49 | | co. s., sh | Few. |
| | | | D5178 | 12 43 00 N.: 122 06 15 E | 318 | | fne. s., sh | Frequent. |
| | | | D5179 | 12 38 15 N.: 122 12 30 E | 78 | | fne. s | Frequent. |
| | | | | | 37 | 75.7 | hrd. s | Frequent. |
| | | | D5184 | 10 18 30 N.: 122 23 30 E | 565 | 49.8 | gn. m | Few. |
| | | | D5185 | 10 05 45 N.: 122 18 30 E | 638 | 49.8 | gn. m | Frequent. |
| | | | D5187 | 9 16 45 N.: 123 21 15 E | 226 | 53.6 | sft. gn. m | Few. |
| | | | D5191 | 10 29 45 N.: 123 31 15 E | 258 | 62.8 | gn. m | Common. |
| | | | D5203 | 9 58 00 N.: 125 07 40 E | 775 | 52.9 | gn. m | Few. |
| | | | D5206 | 11 31 40 N.: 124 42 40 E | 32 | | gn. m | Frequent. |
| | | | D5211 | 11 51 35 N.: 124 14 00 E | 155 | 56.6 | gn. m., s | Few. |
| | | | D5214 | 12 25 18 N.: 123 37 15 E | 218 | 51.4 | gn. m., s | Few. |
| | | | D5215 | 12 31 30 N.: 123 35 24 E | 604 | 50.5 | gn. m., s | Few. |
| | | | D5216 | 12 52 00 N.: 123 23 30 E | 215 | 51.9 | gn. m., s | Frequent. |
| | | | D5217 | 13 00 20 N.: 123 14 15 E | 105 | 63.1 | crs. gy. s | Frequent. |
| | | | D5218 | 13 11 15 N.: 123 02 45 E | 20 | | crs. s | Frequent. |
| | | | D5219 | 13 21 00 N.: 122 18 45 E | 580 | 50.8 | gn. m | Frequent. |
| | | | D5220 | 13 38 00 N.: 121 58 00 E | 50 | | sft. gn. m | Few. |
| | | | D5222 | 13 38 30 N.: 121 42 15 E | 195 | 52.8 | gn. m | Common. |
| | | | D5243 | 6 50 55 N.: 126 14 35 E | 218 | 63.6 | gy. m | Common. |
| | | | D5247 | 7 02 00 N.: 125 38 45 E | 135 | | m | Few. |
| | | | D5259 | 11 57 30 N.: 121 42 15 E | 312 | 49.3 | gy. m | Frequent. |
| | | | D5260 | 12 25 35 N.: 121 31 35 E | 234 | 51.4 | gn. m., s | Frequent. |
| | | | D5261 | 12 30 55 N.: 121 30 50 E | 146 | | s., m | Frequent. |
| | | | D5268 | 13 42 00 N.: 120 57 15 E | 170 | | s., p | Frequent. |
| | | | D5272 | 14 00 00 N.: 120 22 30 E | 118 | 57.4 | m., sh | Few. |
| | | | D5276 | 13 49 15 N.: 120 14 45 E | 18 | | sh., p., s | Frequent. |
| | | | D5282 | 13 53 09 N.: 120 26 45 E | 248 | 47.4 | dk. gy. s | Frequent. |
| | | | D5313 | 21 30 00 N.: 116 43 00 E | 150 | 53.6 | s | Few. |
| | | | D5315 | 21 40 00 N.: 116 58 00 E | 148 | 54.4 | s., sh | Few. |
| | | | D5318 | 21 32 00 N.: 117 46 00 E | 340 | | s., br. Co | Few. |
| | | | D5331 | 15 36 45 N.: 119 47 45 E | 178 | 54.7 | s., sh., m | Few. |
| | | | D5333 | 12 26 30 N.: 120 37 45 E | 310 | 73.8 | s | Few. |
| | | | D5342 | 10 56 55 N.: 119 17 24 E | 14-15 | | gy. m | Few. |
| | | | D5349 | 10 54 00 N.: 118 26 20 E | 730 | 40.6 | Co., s | Frequent. |
| | | | D5369 | 13 48 00 N.: 121 43 00 E | 106 | | bk. s | Few. |
| | | | D5370 | 13 44 15 N.: 121 42 30 E | 159 | 54.3 | sft. m | Few. |
| | | | D5371 | 13 49 40 N.: 121 40 15 E | 83 | | gn. m | Few. |
| | | | D5374 | 13 46 45 N.: 121 35 08 E | 190 | | gy. m | Frequent. |
| | | | D5388 | 12 51 30 N.: 123 26 15 E | 226 | 51.4 | sft. gn. m | Few. |

*Pulvinulina menardii—Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | | | |
| | | | D5394... | 12 00 30 N.: 124 05 36 E.. | 153 | ....... | gn. m....... | Few. |
| | | | D5419... | 9 58 30 N.: 123 46 00 E.. | 175 | 54.5 | gn. m....... | Few. |
| | | | D5428... | 9 13 00 N.: 118 51 15 E.. | 1,105 | 49.7 | gy. m....... | Several. |
| | | | D5429... | 9 41 30 N.: 118 80 22 E.. | 766 | ....... | gn. m....... | Few. |
| | | | D5430... | 9 49 40 N.: 119 03 20 E.. | 464 | 50.0 | glob. oz..... | Few. |
| | U.S.N.M. | 1 | D5439... | 15 58 15 N.: 119 40 20 E.. | 940 | 36.7 | gn. m....... | Few. |
| | | | D5445... | 12 44 42 N.: 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Few. |
| | | | D5449... | 13 21 36 N.: 124 00 30 E.. | 780 | 40.6 | Co., s........ | Few. |
| | U.S.N.M. | 1 | D5459... | 13 10 21 N.: 123 59 54 E.. | 201 | ....... | ............ | Few. |
| | U.S.N.M. | 1 | D5467... | 13 25 27 N.: 123 37 18 E.. | 480 | ....... | gy. m....... | Few. |
| | U.S.N.M. | 1 | D5468... | 13 35 39 N.: 123 40 28 E.. | 569 | ....... | gn. m....... | Few. |
| | | | D5481... | 10 27 30 N.: 125 17 10 E.. | 61 | ....... | s., sh., Co.... | Few. |
| | U.S.N.M. | 1 | D5493... | 9 04 00 N.: 125 20 00 E.. | 478 | 52.1 | gn. m....... | Few. |
| | | | D5523... | 8 48 44 N.: 123 27 35 E.. | ....... | ....... | ............ | Frequent. |
| | | | D5526... | 9 12 45 N.: 123 45 30 E.. | 806 | 52.3 | gn. m....... | Frequent. |
| | | | D5529... | 9 23 45 N.: 123 39 30 E.. | 441 | 53.0 | gy. m....... | Frequent. |
| | | | D5538... | 9 08 15 N.: 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Frequent. |
| | | | D5542... | 8 48 30 N.: 123 35 30 E.. | 200 | 54.3 | fne. s........ | Few. |
| | | | D5543... | 8 47 15 N.: 123 35 00 E.. | 162 | 54.5 | s............ | Frequent. |
| | | | D5546... | 6 06 48 N.: 121 30 32 E.. | 138 | 68.3 | fne. co. s.... | Few. |
| | | | D5551... | 5 54 48 N.: 120 44 24 E.. | 193 | 53.3 | fne. s........ | Few. |
| | | | D5580... | 4 52 45 N.: 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Few. |
| | | | D5590... | 4 10 50 N.: 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Few. |
| | | | D5601... | 1 13 10 N.: 125 17 05 E.. | 765 | ....... | s., glob...... | Common. |
| | | | D5609... | 0 11 00 N.: 121 16 00 E.. | 1,092 | 36.3 | gn. m....... | Few. |
| | | | D5606... | 0 16 28 N.: 121 33 30 E.. | 834 | ....... | gn. m....... | Common. |
| | | | D5612... | 0 38 00 S.: 121 45 40 E.. | 750 | ....... | ............ | Common. |
| | | | D5614... | 0 31 00 N.: 125 58 45 E.. | 1,100 | ....... | gy m., s.... | Common. |
| | U.S.N.M. | 1 | D5619... | 0 35 00 N.: 127 14 40 E.. | 435 | ....... | fne. gy. s.... | Few. |
| | | | D5621... | 0 15 00 N.: 127 24 35 E.. | 298 | ....... | gy. and bk. s. | Few. |
| | | | D5622... | Makyan Island (N. E.), N. 66° W. | 275 | ....... | gy. m ...... | Frequent. |
| | | | D5623... | 0 16 30 N.: 127 30 00 E.. | 272 | ....... | fne. s., m.... | Frequent. |
| | U.S.N.M. | 1 | D5625... | 0 07 00 N.: 127 28 09 E.. | 230 | ....... | gy. m., s.... | Rare. |
| | | | D5632... | 1 00 00 S.: 127 50 00 E.. | 845 | ....... | ............ | Frequent. |
| | | | D5638.. | 3 47 15 S.: 126 23 40 E.. | 517 | ....... | fne. gy. s.... | Frequent. |
| | | | D5640... | 4 27 00 S.: 122 55 40 E.. | 24 | ....... | ............ | Few. |
| | U.S.N.M. | 1 | D5648... | 5 35 00 S.: 122 20 00 E.. | 559 | 39.2 | m........... | Few. |
| | U.S.N.M. | 1 | D5650... | 4 53 45 S.: 121 20 00 E.. | 540 | 40.1 | gn. m....... | Few. |
| | U.S.N.M. | 1 | D5652... | 4 35 00 S.: 121 23 06 E.. | 525 | 41.2 | gn. m....... | Few. |
| | | | D5665... | 4 27 00 S.: 118 44 00 E.. | 1,008 | ....... | m........... | Few. |

## PULVINULINA MENARDII (d'Orbigny), var. FIMBRIATA H. B. Brady.

Plate 66, figs. 2*a–c*.

*Pulvinulina menardii* (D'ORBIGNY), var. *fimbriata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 691, pl. 103, figs. 3*a*, *b*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 55.

This variety seems to be rare in the North Pacific, and is equally so in the region covered. It does not seem to occur in the Archipelago, but rather poorly developed specimens were taken at D5638 in 517 fathoms (946 meters), off Bouro Island, and D5639, in 1,560 fathoms (2,853 meters), Molucca Sea; but in neither case are the specimens at all typical, but tend toward the variety.

*Pulvinulina menardii*, var. *fimbriata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 1 | D5638... | 3 47 15 S.; 126 23 40 E.... | 517 | ....... | fne. gy. s.... | Rare. |
| | | 1 | D5639... | 3 54 50 S.; 123 27 20 E.... | 1,560 | ....... | gy. m........ | Rare. |

### PULVINULINA LATERALIS (Terquem).

Plate 69, figs. 2*a*-*c*.

*Rosalina lateralis* Terquem, Mém. Soc. Géol. France, ser. 3, vol. 1; Mém. 3, 1878 p. 25, pl. 2, figs. 11*a*–*c*.

*Pulvinulina lateralis* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 689, pl. 106, figs. 2, 3.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 413, pl. 18, figs. 48–50.—Millett, Journ. Roy. Micr Soc., 1904, p. 497.—Cushman, Proc. Boston Soc. Nat. Hist., vol. 34, 1906 p. 31, pl. 5, figs. 11, 12.—Sidebottom, Mem Proc. Manchester Lit. and Philos Soc., vol. 53, No. 21, 1909, p. 5, pl. 2, fig. 6, pl. 13, figs. 1, 2 (?).—Heron Allen and Earland, Trans. Zool. London, vol. 20, pt. 17, 1915, p. 714, pl. 53 figs. 6–11.

*Description.*—Test usually somewhat ovate, later chambers becoming rapidly larger and longer on the ventral side, the last-formed chamber often covering at least half the surface of the test; dorsally sutures somewhat limbate, surface generally flattened, ventrally sutures simple, depressed, the surface tumid, finely punctate except the last-formed chamber, which is covered with large circular pores which are often bordered with a somewhat thicker rim of shell material, these pores serving as the aperture.

Test up to 2.5 mm. in diameter.

The records for *P. lateralis* are rather scattered, largely limited to the Indo-Pacific region. It is, however, recorded from numerous areas by Sidebottom and Heron-Allen and Earland had it from the Kerimba Archipelago off the east coast of Africa.

In the Philippine material it has occurred at 11 stations, ranging in depth from 12 to 162 fathoms (22 to 297 meters), average depth 44 fathoms (80 meters). Six of the stations are in the Sulu Sea off Jolo and Tawi Tawi; the others, off Romblon, two stations; between Burias and Luzon; between Marinduque and Luzon; and off Darvel Bay, Borneo. At the two stations off Romblon specimens were fairly frequent in their occurrence; at most other stations rather few.

*Pulvinulina lateralis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12377 | U.S.N.M. | 3 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., co........ | Few. |
| 12379 | U.S.N.M. | 4 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 12378 | U.S.N.M. | 5 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Few. |
| 11624 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co..... | Few. |
| | U.S.N.M. | | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh........ | Few. |
| | U.S.N.M. | | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s.......... | Few. |
| | U.S.N.M. | | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ....... | co. s., sh..... | Few. |
| | U.S.N.M. | | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh..... | Few. |
| | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s.............. | Rare. |
| | U.S.N.M. | | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Frequent. |
| | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Rare. |

### PULVINULINA TUMIDA H. B. Brady.

Plate 66, figs. 3a–c.

*Pulvinulina menardii* D'ORBIGNY, var. *tumida* H. B. BRADY, Geol. Mag., vol. 4, 1877, p. 294; Quart. Journ. Micr. Sci., vol. 19, 1879, p. 80.

*Pulvinulina tumida* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 692, pl. 103, figs. 4–6.—EGGER, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 414, pl. 17, figs. 4–6, 35–37, 44.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. 329, pl. 73, fig. 5.—MILLETT, Journ. Roy. Micr. Soc., 1904, p. 499.—CUSHMAN, Proc. Boston Soc. Nat. Hist., vol. 34, 1908, p. 31; Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 56, pl. 22, fig. 3.

This species, characteristic of *Globigerina*-ooze, has occurred at 26 stations in the area. Most of these are in comparatively deep water. About half of these stations are in the Archipelago proper; the others to the south in the following localities: Gulf of Tomini, Celebes; Molucca Passage, between Gillolo and Makyan; between Gillolo and Kayoa; south of Patiente Strait; south of Bouro Island; Gulf of Boni; Macassar Strait; and Molucca Sea. These stations range in depth from 32 to 1,560 fathoms (59 to 2,853 meters), the average being 437 fathoms (800 meters); bottom temperatures are given at but 10 stations, ranging from 38.2° to 63.6° F. (3.4° to 17.5° C.), the average temperature being 50.3° F. (10.1° C.).

*Pulvinulina tumida—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12350 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ........ | fne. s., sh.... | Rare. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ........ | gn. s.......... | Few. |
| 12349 | U.S.N.M. | 9 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy., s.... | Common. |
| 14441 | U.S.N.M. | 2 | D5243... | 6 50 55 N.; 126 14 35 E... | 218 | 63.6 | gy. m......... | Rare. |
| 14428 | U.S.N.M. | 5 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ........ | gy. m......... | Few. |
| 12348<br>14442 | U.S.N.M. | 10+ | D5639... | 3 54 20 S.; 123 27 20 E... | 1,560 | ........ | gy. m......... | Common. |
| 15711 | U.S.N.M. | 1 | D5671... | 1 05 00 S.; 118 56 00 E... | 960 | 38.2 | gy. m......... | Rare. |
| | | | D5217... | 13 00 20 N.; 123 14 15 E... | 106 | 63.1 | crs. gy. s..... | Few. |
| | U.S.N.M. | 1 | D5241... | 6 50 45 N.; 126 14 38 E... | 215 | ........ | sft. gy. m.... | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ........ | s., p.......... | Few. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ........ | co. s.......... | Few. |
| | | | D5446... | 12 43 51 N.; 124 59 18 E... | 800 | ........ | gn. m......... | Few. |
| | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ........ | s., sh. g....... | Few. |
| | U.S.N.M. | 1 | D5542... | 8 48 30 N.; 123 35 30 E... | 200 | 54.3 | fne. s., brk. sh | Few. |
| | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s.............. | Few. |
| | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s.............. | Few. |
| | | | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ........ | ............... | Few. |
| | U.S.N.M. | 1 | D5619... | 0 35 00 N.; 127 14 40 E... | 435 | ........ | fne. gy. s., m. | Few. |
| | | | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ........ | gy. and bk. s. | Few. |
| | | | D5626... | 0 07 30 N.; 127 29 00 E... | 265 | ........ | gy. m., fne. s. | Few. |
| | U.S.N.M. | 1 | D5632... | 1 00 00 S.; 127 50 00 E... | 845 | ........ | ............... | Few. |
| | | | D5638... | 3 47 15 S.; 126 23 40 E... | 517 | ........ | fne. gy. s..... | Few. |
| | | | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m......... | Few. |
| | | | D5665... | 4 27 00 S.; 118 44 00 E... | 1,008 | ........ | m............. | Few. |
| | | | D5543... | 8 47 15 N.; 123 35 00 E... | 162 | 54.5 | s.............. | |

### PULVINULINA CANARIENSIS (d'Orbigny).

Plate 67, figs. 1*a*–*c*.

*Rotalina canariensis* D'ORBIGNY in Barker, Webb, and Berthelot, Hist. Nat. Îles Canaries, vol. 2, pt. 2, 1839, "Foraminifères," p. 130, pl. 1, figs. 34–36.

*Pulvinulina canariensis* OWEN, Journ. Linn. Soc. London, vol. 9, 1867, p. 148, pl. 5, fig. 21.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 692, pl. 103, figs. 8–10.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 56, pl. 23, fig. 1, text figs. 55*a*–*c*.

Rather strangely this species has occurred rarely in the region to the southward, but not at all in the Archipelago as far as the collections show. Material is typical, but found only as single specimens or in few numbers. It was found at the following stations: D5606, in 834 fathoms (1,525 meters), Gulf of Tomini, Celebes; D5621, in 298 fathoms (545 meters), between Gillolo and Makyan Islands; D5638, in 517 fathoms (946 meters), off Bouro Island; and D5650, in 540 fathoms (988 meters), Gulf of Boni.

*Pulvinulina canariensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14483 | U.S.N.M. | 1 | D5606... | 0 16 28 N.; 121 33 30 E.. | 834 | ....... | gn. m....... | Rare. |
| 14482 | U.S.N.M. | 1 | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. and bk. s. | Rare. |
| | | | D5638... | 3 47 15 S.; 126 23 40 E.. | 517 | ....... | fne. gy. s.... | |
| | | | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | |

### PULVINULINA CRASSA (d'Orbigny).

Plate 67, figs. 3*a*–*c*.

*Rotalina crassa* D'ORBIGNY, Mém. Soc. Géol. France, vol. 4, 1840, p. 32, pl. 3, figs. 7–8.

*Pulvinulina crassa* OWEN, Journ. Linn. Soc. London, vol. 9, 1867, p. 148, pl. 5, figs. 8(?), 9.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 694, pl. 103, figs. 11–12.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 58, pl. 27, fig. 1.

While this species has been taken as pelagic, the main records of its occurrence are from fairly deep water. It has been noted as single specimens at but two stations: D5201, in 554 fathoms (1,012 meters), Sogod Bay, southern Leyte; and D5580, in 162 fathoms (297 meters), Darvel Bay, Borneo.

*Pulvinulina crassa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12694 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s. and m. | Rare. |
| 11622 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |

### PULVINULINA TRUNCATULINOIDES (d'Orbigny).

Plate 67, figs. 2*a*–*c*.

*Rotalina truncatulinoides* D'ORBIGNY in Barker, Webb, and Berthelot, Hist. Nat. Îles Canaries, vol. 2, pt. 2, 1839, "Foraminifères," p. 132, pl. 2, figs. 25–27.

*Pulvinulina truncatulinoides* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 398, pl. 16, figs. 41–43.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 59, pl. 23, fig. 4, text figs. 57*a*–*c*.

*Rotalina micheliniana* D'ORBIGNY, Mém. Soc. Géol. France, vol. 4, 1840, p. 31, pl. 3, figs. 1–3.

*Pulvinulina micheliniana* OWEN, Journ. Linn. Soc. London, vol. 9, 1867, p. 148, pl. 5, fig. 17.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 694, pl. 104, figs. 1–2.

Although fairly well distributed the species was recorded as occurring at but one station outside the Philippines proper—at D5665, in 1,008 fathoms (1,844 meters), Macassar Strait. In the Archipelago it occurrs on both the southwestern and eastern coasts of Luzon; Verde Island Passage; east coast of Mindanao and Gulf of Davao; Sulu Sea and Palawan Passage; thus not being recorded except in waters either on the outer side of the Archipelago or in the direct connections with interior waters. Stations range in depth from 49 to 1,008 fathoms (90 to 1,844 meters), with the average 397 fathoms (727 meters). Bottom temperatures range from 40.6° to 56.4° F. (4.7° to 13.5° C.), the average 46.5° F. (8.0° C.).

*Pulvinulina truncatulinoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1345 | U.S.N.M. | 2 | D5120... | 13 45 30 N.; 120 30 15 E.. | 398 | 43.7 | gn. m., s..... | Rare. |
| 1344 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 1335 | U.S.N.M. | 2 | D5247... | 7 02 00 N.; 125 38 45 E.. | 135 | ....... | m.......... | Rare. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s..... | Common. |
| 1346 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s........ | Rare. |
| 1347 | U.S.N.M. | 4 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | Co., s........ | Rare. |
| 1444 | U.S.N.M. | 3 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m........ | Rare. |
| | | | D5665... | 4 27 00 S.; 118 44 00 E.. | 1,008 | ....... | m.......... | Rare. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh.... | Few. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Few. |

### PULVINULINA UMBONATA (Reuss).

Plate 71, figs. 1*a*–*c*.

*Rotalina umbonata* REUSS, Zeitschr. deutsch. geol. Ges., vol. 3, 1851, p. 75, pl. 5, figs. 35*a*–*c*.

*Pulvinulina umbonata* REUSS, Denkschr. Akad. Wiss. Wien, vol. 25, 1866, p. 206.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 695, pl. 105, figs. 2*a*–*c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 60, pl. 27, fig. 2.

This species seems to be rare in the region, having been noted at but three stations, all near Luzon, as follows: D5219, in 530 fathoms (969 meters), between Marinduque and Luzon; D5468, in 569 fathoms

(1,040 meters); and D5469, in 500 fathoms (914 meters), both on the east coast of Luzon.

*Pulvinulina umbonata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12355 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E.. | 530 | 50.8 | gn. m....... | Rare. |
| 12354 | U.S.N.M. | 2 | D5468... | 13 35 39 N.; 123 40 28 E.. | 569 | ....... | gn. m....... | Rare. |
| 14453 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |

### PULVINULINA EXIGUA H. B. Brady.

Plate 68, figs. 3*a–c*.

*Pulvinulina exigua* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 696, pl. 103, figs. 13, 14.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 60, pl. 23, fig. 5.

This seems to be a rare species for the region as far as the material shows, possibly owing to the fact that it seems to be more characteristic of deeper waters. The only station at which material was recorded is D5349 in 730 fathoms (1,335 meters), Palawan Passage, bottom temperature 40.6° F. (4.7° C.). In material from this station several typical specimens were found.

*Pulvinulina exigua—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14431 | U.S.N.M. | 8 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | Co., s....... | Rare. |

### PULVINULINA PAUPERATA (Parker and Jones).

Plate 68, fig. 2.

*Pulvinulina repanda*, var. *menardii*, subvariety *pauperata* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 395, pl. 16, figs. 50, 51.

*Pulvinulina pauperata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 696, pl. 104, figs. 3–11.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 61, pl. 23, figs. 2, 3, text figs. 58*a*, *b*.

Although this species was found at 10 stations, but two of these are in the Philippines, or rather on their borders—D5236 in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, and D5439, in 940 fathoms (1,719 meters), off the west coast of Luzon. To the southward it has occurred at three stations off Sibuko Bay, Borneo; in the Gulf of Tomini, Celebes; south of Patiente Strait; Molucca Sea; and Macassar Strait. The depths range from 260 to 1,560 fathoms (476 to 2,853 meters), with the average 699 fathoms (1,278 meters). Bottom temperatures are given at six stations, ranging from 36.7° F to 44.0° F. (2.6° C. to 6.6° C.), with the average 40.3° F. (4.6° C.). From the known records of this species it is a deep-water form, and would hardly be expected inside the Archipelago unless in the Sulu Sea.

At D5236 a peculiar modification of the species occurs, where the broad carina instead of being thin and translucent, as in typical specimens, often becomes encrusted with fine sand grains, even to such an extent that it becomes in some cases thicker than the central chambers. This character was not noted at any of the other stations.

*Pulvinulina pauperata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 15714 | U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| [illegible] | | 6 | | | | | | |
| [illegible] | U.S.N.M. | 3 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m....... | Few. |
| [illegible] | U.S.N.M. | 5 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Rare. |
| [illegible] | U.S.N.M. | 4 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E.. | 750 | ....... | ............... | Rare. |
| [illegible] | U.S.N.M. | 5 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | co. s., m..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m....... | Rare. |
| [illegible] | | 2 | | | | | | |
| [illegible] | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Rare. |

### PULVINULINA SCHREIBERSII (d'Orbigny).

*Rotalina schreibersii* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 154, pl. 8, figs. 4–6.

*Pulvinulina schreibersii* PARKER and JONES, Philos. Trans., vol. 155, 1865, p. 393.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 697, pl. 115, figs. 1*a*–*c*.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 106.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 62, fig. 59 (in text).

From the available records this species is largely limited to the Indo-Pacific and Mediterannean regions. Brady records it from seven *Challenger* stations from the south Pacific, ranging in depth from 3 to 155 fathoms (5 to 283 meters).

*Pulvinulina schreibersii.—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| | | | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Few. |
| | | | D5132... | Island off Panabutan Point, N; 15° W., .3 mile. | 26 | ....... | gn. m., s..... | Frequent. |
| | | | D5133... | Island off Panabutan Point, N; 52° E. 1.5 miles. | 38 | ....... | gn. m., s..... | Few. |
| | | | D5134... | 6 44 45 N.; 121 40 00 E.. | 25 | ....... | fne. s........ | Frequent. |
| 11914 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Frequent. |
| 12343 | U.S.N.M. | 6 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Common. |
| 14437 | U.S.N.M. | 10 | D5272... | 14 00 00 N.; 120 22 30 E.. | 118 | 57.4 | m., sh., co. s. | Common. |
| 14435 | U.S.N.M. | 4 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Few. |
| 14436 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | co. s., sh..... | Rare. |

### PULVINULINA PROCERA H. B. Brady.

Plate 69, figs. 1*a*–*c*.

*Pulvinulina procera* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 661; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 698, pl. 105, figs. 7*a*-*c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 62, pl. 24, fig. 2; pl. 25, fig. 2.

Brady described this species from three *Challenger* stations off Kandavu, Fiji Islands, 210 fathoms (384 meters), Torres Strait, off Raine Island, 155 fathoms (283 meters), and off Cape York, 3 to 11 fathoms (5 to 20 meters). I have had the species previously from off the Hawaiian Islands and off southern Japan. It is evidently a tropical species of the Indo-Pacific, in comparatively shallow water. It has occurred in the Philippine material in the following localities: China Sea, off southern Luzon; off western Samar; China Sea, off Hongkong; Darvel Bay, Borneo; vicinity of Jolo; vicinity of Romblon; off northern Cebu; between Burias and Luzon; Pacific Ocean, east coast of Mindanao; China Sea, off Formosa; Ragay Gulf, Luzon; between Samar and Leyte; and north of Tawi Tawi. It has, however, not been common at any of these stations, and was not abundant in any of the shallow-water stations where other species of this genus are very abundant.

*Pulvinulina procera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11910 | U.S.N.M. | 1 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s., sh. | Rare. |
| 11990 | U.S.N.M. | 2 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Rare. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s......... | Few. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s., m.... | Few. |
| 11912 | U.S.N.M. | 3 | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s.... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 68.1 | crs. gy. s..... | Few. |
| 11913 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 11911 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Few. |
| | | | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s......... | Few. |
| 12335 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. sh....... | Rare. |
| | | | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Few. |
| | | | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Few. |
| 14452 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s......... | Rare. |
| 12353 | U.S.N.M. | 2 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co..... | Rare. |
| | | | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Frequent. |
| | | | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh..... | Few. |
| 15740 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Few. |
| | | 1 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh............ | Rare. |
| | | | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ....... | s., sh., g...... | Few. |
| 15741 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Rare. |
| | | | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Few. |
| | | | D5574... | 5 30 45 N.; 120 07 57 E.. | ....... | ....... | ............. | Few. |
| | | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Rare. |

### PULVINULINA ELEGANS (d'Orbigny).

*Rotalia* (*Turbinulina*) *elegans* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 276, No. 54.

*Pulvinulina elegans* Jones and Parker, Geologist, vol. 7, 1864, p. 88.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 699, pl. 105, figs. 4–6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 63, pl. 26, fig. 3.

In the *Challenger* Report Brady practically unites *P. elegans* and *P. partschiana*, the former more common in shallow water, the latter in deeper water. In the Philippine material I have examined, *P. elegans* was noted at 76 stations, ranging in depth from 24 to 1,092 fathoms (44 to 1,998 meters), averaging 365 fathoms (668 meters), while *P. partschiana* occurred at but 11 stations, ranging from 32 to 742 fathoms (59 to 1,357 meters), with the average 301 fathoms (551 meters). As a matter of interest the records were compared for the two species and both species were recorded from but two stations in common. This would indicate that, as far as this area is concerned, the two species seem to be rather distinct.

In this connection it seems worthy of note that in their Kerimba Archipelago work [28] Heron-Allen and Earland record as noteworthy the occurrence of *P. partschiana* in very shallow water, and in the same region they had a single specimen of *P. elegans*, and that is noted as a "weak specimen."

The distribution of *P. elegans* covers the whole area dredged, both through the Archipelago and all the region to the southward in which dredgings were made.

*Pulvinulina elegans—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m.... | Frequent. |
| | | | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh.... | Few. |
| | | | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh.... | Few. |
| | | | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh... | Few. |
| [illegible] | U.S.N.M. | 7 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Frequent. |
| | | | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Frequent. |
| | | | D5208... | 9 58 00 N.; 125 07 40 E.. | 775 | 52.9 | gn. m........ | Few. |
| | | | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| | | | D5219... | 13 21 00 N.; 122 18 45 E.. | ....... | ....... | ............... | |
| [illegible] | U.S.N.M. | 6 | D5236... | 8 50 45 N.; 126 26 52 E.. | 530 | 50.8 | gn. m........ | Few. |
| | | | D5243... | 6 50 55 N.; 126 14 35 E.. | 494 | 41.2 | fne. gy. s... | Common. |
| | | | D5244... | 6 52 05 N.; 126 14 15 E.. | 218 | 63.6 | gy. m........ | Few. |
| | | | D5258... | 10 27 45 N.; 122 12 30 E.. | 171 | ....... | gy. m........ | Few. |
| | U.S.N.M. | 2 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m......... | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p.......... | Frequent. |
| | | | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Few. |
| | | | D5278... | 14 00 10 N.; 120 17 15 E.. | 120 | 59.6 | fne. s., m... | Few. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s.... | Few. |
| 14464 | U.S.N.M. | 10 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Common. |
| | U.S.N.M. | 1 | D5301... | 20 37 00 N.; 115 43 00 E.. | 208 | 50.5 | gy. m., s.... | Rare. |
| | | | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............. | Few. |
| | | | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s. br. Co..... | Few. |
| | U.S.N.M. | 1 | D5331... | 15 36 45 N.; 119 47 45 E.. | 178 | 54.7 | s., sh. m..... | Rare. |
| | | | D5370... | 13 44 15 N.; 121 42 30 E.. | 159 | 54.3 | sft. m........ | Few. |
| | | | D5374... | 13 46 45 N.; 121 35 08 E.. | 190 | ....... | gy. m........ | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Few. |
| | | | D5398... | 11 35 12 N.; 124 13 48 E.. | 114 | ....... | gn. m........ | Frequent. |
| | U.S.N.M. | 1 | D5410... | 10 28 45 N.; 124 05 30 E.. | 385 | ....... | gn. m........ | Rare. |
| | U.S.N.M. | 1 | D5412... | 10 09 15 N.; 123 52 00 E.. | 162 | 54.8 | gn. m........ | Rare. |
| | | | D5423... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m., co. s. | Few. |
| | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E.. | 940 | 36.7 | gn. m........ | Rare. |
| | | | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Few. |
| | | | D5449... | 13 21 36 N.; 124 00 30 E.. | 730 | 40.6 | co. s......... | Few. |
| 12363 | U.S.N.M. | 10+ | D5460... | 13 32 30 N.; 123 37 18 E.. | 480 | ....... | gy. m........ | Common. |
| | | | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m........ | Common. |
| 12364 | U.S.N.M. | 6 | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m........ | Few. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m........ | Frequent. |
| | | | D5470... | 13 37 30 N.; 123 41 09 E.. | 560 | ....... | m............. | Few. |
| | U.S.N.M. | 1 | D5487... | 10 02 45 N.; 125 05 33 E.. | 782 | 53.3 | gn. m........ | Rare. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............... | Few. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m........ | Few. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m........ | Few. |

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[28] Trans. Zool. Soc. London, vol, 20, pt. 17, 1915, p. 717.

*Pulvinulina elegans*—*Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Few. |
| | | | D5542... | 8 48 30 N.; 123 35 30 E.. | 200 | 54.3 | fne. s....... | Few. |
| | U.S.N.M. | 1 | D5543... | 8 47 15 N.; 123 35 00 E.. | 162 | 54.5 | s........... | Rare. |
| | | | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk. sh... | Frequent. |
| | | | D5566... | 5 52 12 N.; 120 31 00 E.. | 244 | 52.5 | fne. sh., s... | Few. |
| | U.S.N.M. | 1 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52.0 | fne. s....... | Rare. |
| | | | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s........ | Frequent. |
| | | | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s....... | Few. |
| | | | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s........... | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s........... | Few. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Few. |
| 12361 | U.S.N.M. | 1 | D5582 .. | 4 19 54 N.; 118 58 38 E.. | 890 | 38.3 | gy. m........ | Rare. |
| | | | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Few. |
| | | | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Few. |
| | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Few. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m........ | Few. |
| 12359 | U.S.N.M. | 2 | D5606... | 0 16 23 N.; 121 33 30 E.. | 834 | ....... | gn. m........ | Few. |
| | U.S.N.M. | 1 | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m........ | Few. |
| | | | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............... | Few. |
| | | | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m........ | Common. |
| | | | D5621... | 0 15 00 N.; 127 24 35 E... | 298 | ....... | gy. s........ | Few. |
| | U.S.N.M. | 1 | D5623... | 0 16 30 N.; 127 30 00 E... | 272 | ....... | fne. s........ | Few. |
| 12360 | U.S.N.M. | 2 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m.... | Few. |
| | U.S.N.M. | 1 | D5632... | 1 00 00 S.; 127 50 00 E... | 845 | ....... | ............... | Few. |
| 12362 | U.S.N.M. | 2 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Few. |
| | | | D5640... | 4 27 00 S.; 122 50 44 E... | 24 | ....... | s., brk. sh... | Few. |
| | U.S.N.M. | 1 | D5648... | 5 35 00 S.; 122 20 00 E... | 559 | 39.2 | gn. m........ | Few. |
| | | | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Frequent. |
| | | | D5652... | 4 35 00 S.; 121 23 06 E... | 525 | 41.2 | gn. m........ | Few. |
| 12357 | U.S.N.M. | 6 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | ............... | Few. |
| 15742 | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s.... | Few. |
| | | | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m........ | Frequent. |
| 14911 | U.S.N.M. | 1 | *Nero* 849 | 15 16 00 N.; 121 40 00 E... | 737 | ....... | gn. m........ | Rare. |

## PULVINULINA PARTSCHIANA (d'Orbigny).

*Rotalina partschiana* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 153, pl. 7, figs. 28–30, pl. 8, figs. 1–3.

*Pulvinulina partschiana* REUSS, Sitz. Akad. Wiss. Wien, vol. 62, 1870, p. 36.—VON SCHLICHT, Foram. Pietzpuhl, 1870, pl. 20, figs. 23–25, 29–31.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 699, pl. 105, figs. 3*a–c*, woodcut, fig. 21.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 64, text figs. 60*a–c*.

Mention has already been made of the distribution of this species in comparison with *P. elegans*. Not mentioned there, however, is the peculiar fact that *P. partschiana*, as far as our material seems to show, is limited to the area of the Archipelago and not found in the material to the southward, where *P. elegans* is fairly common.

*Pulvinulina partschiana*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F | | |
| 12339 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E.. | 393 | 43.7 | gn. m., s.... | Rare. |
| 12340 | U.S.N.M. | 1 | D5126... | 10 34 54 N.; 121 47 30 E.. | 742 | 49.5 | sft. gn. m... | Rare. |
| 12341 | U.S.N.M. | 4 | D5187... | 9 16 45 N.; 123 21 15 E.. | 225 | 53.6 | sft. gn. m... | Few. |
| 12352 | U.S.N.M. | 4 | D5217... | 13 00 20 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| 12342 | U.S.N.M. | 2 | D5247... | 7 02 00 N.; 125 38 45 E.. | 135 | ....... | m........... | Rare. |
| 12384 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| 14440 | U.S.N.M. | 2 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s.... | Few. |
| 14439 | U.S.N.M. | 6 | D5370... | 13 44 15 N.; 121 42 30 E.. | 159 | 54.3 | sft. m....... | Common. |
| 14902 | U.S.N.M. | 2 | *Nero* 849 | 15 16 00 N.; 121 40 00 E.. | 737 | ....... | gn. m....... | Rare. |

## Genus ROTALIA Lamarck, 1804.

### ROTALIA BECCARII (Linnaeus).

Plate 70, figs. 3*a–c*.

*Nautilus beccarii* Linnaeus, Syst. Nat., ed. 12, 1767, p. 1162; ed. 13 (Gmelin's), 1788, p. 3370, No. 4.

*Rotalia* (*Turbinulina*) *beccarii* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 276, No. 40; Modèles, 1826, No. 74.

*Rotalia beccarii* Parker and Jones, Philos. Trans., vol. 155, 1865, p. 388, pl. 16, figs. 29, 30.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 704, pl. 107, figs. 2, 3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 67, pl. 30, fig. 3.

Although the number of stations for this species is large, there are no stations among them from the region south of the Philippines themselves. It occurred in general in the following localities: Off Formosa; China Sea, off western and southern Luzon; Baylayan Bay and Verde Island Passage; between Marinduque and Luzon; between Burias and Luzon; off Romblon; east of Masbate; east coast of Luzon; off northwestern Panay; between Panay and Negros; Tanon Strait, east coast of Negros; between Siquijor and Bohol; Sogod Bay, southern Leyte; eastern Illana Bay, southern Mindanao; off Jolo; off Tawi Tawi; off eastern Palawan and Palawan Passage. These localities cover the area fairly well. The range in depth is from 12 to 805 fathoms (22 to 1,472 meters), with a few specimens from Little Harbor, near Manila, in a few feet of water; the average depth of all stations, 315 fathoms (582 meters). Bottom temperatures range from 40.6° to 63.1° F. (4.70° to 17.2° C.), with the average 51.3° F. (10.7° C.).

The specimens as a rule were rather small, with little or no raised surface ornament, and the usual brownish tinge to the translucent test.

*Rotalia beccarii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5112... | 13 48 22 N.; 120 47 25 E... | 177 | 52.4 | dk. gn. m.... | Few. |
| 14663 | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E... | 340 | ....... | fne. s......... | Rare. |
| 14664 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s..... | Rare. |
| | | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| 14665 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E... | 106 | 63.1 | crs. gy. s..... | Rare. |
| | | 1 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............. | Rare. |
| 14666 | U.S.N.M. | 4 | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m........ | Rare. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| 14667 | U.S.N.M. | 3 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| | | | D5185... | 10 05 45 N.; 122 18 30 E... | 638 | 49.8 | gn. m........ | Rare. |
| 14668 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co..... | Rare. |
| 14428 | U.S.N.M. | 3 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m........ | Few. |
| 14469 | U.S.N.M. | 5 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Few. |
| 14670 | U.S.N.M. | 9 | Cebu..... | .............................. | ...... | ....... | ............... | |
| | U.S.N.M. | 1 | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn. m........ | Rare. |
| | | | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Few. |
| | U.S.N.M. | 1 | D5215... | 12 31 30 N.; 123 35 24 E... | 604 | 50.5 | gn. m........ | Rare. |
| | | | D5222... | 13 38 30 N.; 121 42 15 E... | 195 | 52.8 | gn. m........ | Few. |
| | | | D5257... | 7 22 12 N.; 124 12 15 E... | 28 | ....... | m............ | Few. |
| | | | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p.......... | Few. |
| | U.S.N.M. | 1 | D5331... | 15 36 45 N.; 119 47 45 E... | 178 | 54.7 | s. sh., m..... | Rare. |
| | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | co. s ........ | Rare. |
| | | | D5430... | 9 49 40 N.; 119 03 20 E... | 464 | 50.0 | glob. ooze.... | Few. |
| | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s..... | Rare. |

### ROTALIA BROECKHIANA Karrer.

Plate 72, figs. 1*a–c*.

*Rotalia broeckhiana* KARRER, in Drasche, Geol. Insel Luzon, 1878, p. 98, pl. 5, fig. 26.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 705, pl. 107, figs. 4*a–c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 68, pl. 27, fig. 4; pl. 30, fig. 2, text figs. 61*a–c*.

Although of wide distribution in the area this species is represented at but 13 stations, and at most of these by very few specimens. The specimens, however, are very typical, both in size and other specific characters.

The stations include the following localities: China Sea, off Formosa; Verde Island Passage and Batangas Bay; Mindoro Strait; between Siquijor and Bohol; east coast of Mindanao; off Jolo; Palawan Passage; and in the region to the south, off Bouro Island and Gulf of Tomini, Celebes.

In depth these stations range from 220 to 805 fathoms (403 to 1,472 meters), with the average depth 492 fathoms (901 meters). Bottom temperatures range from 41.2° to 73.8° F. (5.1° to 23.2° C.), with the average 52.0° F. (11.1° C.).

*Rotalia broeckhiana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14871 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Rare. |
| 14872 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Rare. |
| | | 1 | D5269... | 13 39 50 N.; 120 59 36 E... | 220 | ....... | fne. s., p..... | Rare. |
| 14873 | U.S.N.M. | 4 | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............ | Rare. |
| | | 1 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co.... | Rare. |
| 14874 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s........ | Rare. |
| | | | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............ | Rare. |
| 14875 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Rare. |
| | | | D5423... | 9 38 30 N.; 121 11 00 E... | 508 | 49.8 | gy. m........ | Rare. |
| 14876 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ............ | Rare. |
| | | | D5449... | 13 21 36 N.; 124 00 30 E... | 730 | 40.6 | Co., s........ | Rare. |
| 14877 | U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Rare. |
| | | 1 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m........ | Rare. |

### ROTALIA ORBICULARIS d'Orbigny.

*Rotalia* (*Gyroidina*) *orbicularis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 278, No. 1; Modèles, 1826, No. 13.

*Rotalia orbicularis* H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 470, pl. 48, fig. 16; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 706, pl. 107, fig. 5; pl. 115, fig. 6.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 68, pl. 29, fig. 3; text figs. 62*a–c*.

Typical specimens of this species seem to be rare. The fact that later authors have departed more or less widely from the typical form described by d'Orbigny has been noted by Heron-Allen and Earland.[34] At only two stations have specimens been found which have seemed really identical with this species—D5217, in 105 fathoms (193 meters), between Burias and Luzon, bottom temperature, 63.1° F. (17.2° C.); and D5260, in 234 fathoms (428 meters), off southeastern Mindoro, bottom temperature 51.4° F. (10.8° C.). At each of these stations a few specimens were found.

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[34] Trans. Zool. Soc. London, vol. 20, pt. 17, 1915, p. 718.

*Rotalia orbicularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 430 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s..... | Rare. |
| 429 | U.S.N.M. | 4 | D5260... | 12 26 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s..... | Few. |

### ROTALIA SCHROETERIANA Parker and Jones.

Plate 73, figs. 1*a*–*c*.

*Faujasina*, species, WILLIAMSON, Trans. Micr. Soc., London, ser. 2, vol. 1, 1853, p. 87, pl. 10.

*Rotalia schroeteriana* (Parker and Jones, MS), CARPENTER, Introd. Foram., p. 213, pl. 13, figs. 7–9.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 707, pl. 115, figs. 7*a*–*c*.

Brady gives the following note in the *Challenger* Report in regard to this species:

> Though somewhat local in distribution, it is by no means rare amongst the islands of the Eastern Archipelago, at depths of less than 50 or 60 fathoms (91 or 110 meters).

The only records for this species in the Philippine region are in the Archipelago proper, mostly in shallow water.

*Rotalia schroeteriana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14593 | U.S.N.M. | 10+ | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............ | Common. |
| 14594 | U.S.N.M. | 3 | D5336... | 11 37 45 N.; 119 46 00 E... | 46 | ....... | s., m......... | Few. |
| 14595 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., m...... | Common. |
| 14596 | U.S.N.M. | 10+ | D5342... | 10 56 55 N.; 119 17 24 E... | 14–25 | ....... | gy. m......... | Common. |
| 14597 | U.S.N.M. | 10+ | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s.......... | Common. |
| 14598 | U.S.N.M. | 7 | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s..... | Common. |
| 12879 | U.S.N.M. | 2 | .......... | Manila Bay.............. | ...... | ....... | .............. | Few. |

### ROTALIA PAPILLOSA H. B. Brady.

Plate 72, figs. 3*a*, *b*.

*Rotalia papillosa* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 708, pl. 106, figs. 9*a*–*c*.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 70, pl. 31, fig. 1.

From available records this species is characteristic of the Indo-Pacific region, and in the Philippines it is certainly one of the most abundant species. The ornamentation is beautifully sculptured, and varies considerably in strength but very little in its main characters. The list of stations at which it occurs would be a recapitulation of the main localities at which dredging was done, from Formosa on the north through the large part of the Archipelago. Besides this general area it occurs at two stations to the south—D5580, in 162 fathoms (297 meters), Darvel Bay, Borneo, bottom temperature 55.8° F. (13.2° C.); and D5585, in 476 fathoms (871 meters), Sibuko Bay, Borneo, bottom temperature 41.1° F. (5° C.). The general distribution should be modified, however, to this extent, that the species is characteristic of the protected waters among the islands of the Archipelago and on the western border along the China Sea, but is not represented at the stations on the eastern coast bordered by the open Pacific. The range in depth is from 18 to 476 fathoms (33 to 871 meters), the average depth 118 fathoms (203 meters), the bottom temperatures ranging from 41.1° F. to 55.8° F. (5° C. to 13.2° C.), average 51.2° F. (10.7° C.).

*Rotalia papillosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14846 | U.S.N.M. | 10+ | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ........ | gy.m.,s.,sh. | Common. |
| 14847 | U.S.N.M. | 10 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ........ | gy.s.......... | Common. |
| 14850 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N., 15° W., E., 0.30 mile. | 26 | ........ | gn.m.,s...... | Common. |
| 14851 | U.S.N.M. | 9 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ........ | fne.s......... | Common. |
| 14852 | U.S.N.M. | 4 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ........ | s.,sh......... | Few. |
| 14853 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ........ | m.,fne.s..... | Common. |
| 14854 | U.S.N.M. | 8 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ........ | gn.s.......... | Common. |
| 14855 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ........ | crs.s......... | Rare. |
| 14857 | U.S.N.M. | 10 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ........ | s.,p.......... | Common. |
| 14859 | U.S.N.M. | 9 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ........ | sh.,p.,s...... | Common. |
| 14861 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............. | Rare. |
| 14827 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s.,sh......... | Rare. |
| 14832 | U.S.N.M. | 10+ | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ........ | gy.m......... | Common. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br.s.,Co..... | |
| | | | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy.m......... | |

**ROTALIA PAPILLOSA H. B. Brady, var. COMPRESSIUSCULA H. B. Brady.**

Plate 72, figs. 2*a–c*.

*Rotalia papillosa* H. B. Brady, var. *compressiuscula* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 708, pl. 107, figs. 1*a–c*; pl. 108, figs. 1*a–c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 70, pl. 30, fig. 1.

The variety seems to be slightly more restricted in its range than the typical form, not being recorded to the southward of the Archipelago proper, although well distributed among the islands and in the China Sea. The range of depth is from 16 to 560 fathoms (29 to 1,024 meters), the average depth being 179 fathoms (327 meters). Bottom temperatures range from 50.5° F. to 63.1° F. (10.2° C. to 17.2° C.), the average being 61.1° F. (16.1° C.).

At some of the stations specimens occurred in very considerable numbers, at a few really abundant. Among the stations from which this variety was described by Brady is one *Challenger* station in the Philippines in 95 fathoms (174 meters.) Although the typical form and the variety both occur commonly in shallow water they were most abundant in the Philippine material from 100 to 125 fathoms (183 to 229 meters).

*Rotalia papillosa*, var. *compressiuscula*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14848 | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Common. |
| 14849 | U.S.N.M. | 10+ | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Common. |
| 14856 | U.S.N.M. | 10+ | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m........... | Common. |
| 14860 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s. p.......... | Common. |
| 14858 | U.S.N.M. | 7 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh., co. s. | Few. |
| 14862 | U.S.N.M. | 8 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............. | Few. |
| 14826 | U.S.N.M. | 7 | D5385... | 13 24 50 N.; 123 03 70 E... | 32.7 | 62.4 | gy. m........ | Few. |
| 14829 | U.S.N.M. | 9 | D5394... | 12 00 30 N.; 124 05 36 E... | 153 | ....... | gn. m........ | Common. |
| | | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m........ | Rare. |
| 14830 | U.S.N.M. | 2 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............ | Rare. |
| 14831 | U.S.N.M. | 7 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Few. |
| | | | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk. gy. m... | Frequent. |
| | | | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Few. |
| | | | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s........ | Frequent. |
| | | | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s........ | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Frequent. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Frequent. |
| | | | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m........ | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s. m.......... | Few. |
| | | | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p.... | Frequent. |
| | | | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Few. |
| | | | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m........ | Few. |
| | | | D5374... | 13 46 44 N.; 121 35 08 E... | 190 | ....... | gy. m........ | Few. |
| | | 1 | D5410... | 10 28 45 N.; 124 05 30 E... | 385 | ....... | gn. m........ | Rare. |
| | | | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m........ | Frequent. |
| | | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m........ | Rare. |
| | | | D5420... | 9 49 35 N.; 123 45 00 E... | 127 | 59 | .................. | Few. |
| | | 1 | D5443... | 12 43 51 N.; 124 58 50 E... | 241 | 51.3 | co. s., sh.... | Few. |

### ROTALIA SOLDANII d'Orbigny.

Plate 71, figs. 2*a*–*c*.

*Rotalia* (*Gyroidina*) *soldanii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 278, No. 5; Modèles, 1826, No. 36.

*Rotalia soldanii* HANTKEN, Mitt. Jahrb. ung. geol. Anstalt., 1875, p. 80, pl. 9, figs. 7*a*–*c*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 706, pl. 107, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 71, pl. 29, fig. 1; pl. 31, fig. 4.

In the Philippine region this species occurs at widely scattered stations, usually not in any considerable numbers. It also keeps to its usual condition of being found in comparatively deep water, the range here being from 78 to 1,560 fathoms (143 to 2,853 meters), the last in the Molucca Sea, average 530 fathoms (969 meters). Bottom temperatures range from 41.2° F. to 73.8° F. (5.1° C. to 23.2° C.), average 52.7° F. (11.4° C.). The localities include Mindoro Strait; off Romblon; between Siquijor and Bohol; between Negros and Siquijor; between Leyte and Mindanao; Sogod Bay, southern Leyte; Pacific Ocean, east coast of Mindanao; Gulf of Davao, Mindanao; north of Tawi Tawi; off Palawan; Darvel Bay, Borneo; Sibuko Bay, Borneo; Molucca Sea; and Macassar Strait.

abundant species. The ornamentation is beautifully sculptured, and varies considerably in strength but very little in its main characters. The list of stations at which it occurs would be a recapitulation of the main localities at which dredging was done, from Formosa on the north through the large part of the Archipelago. Besides this general area it occurs at two stations to the south—D5580, in 162 fathoms (297 meters), Darvel Bay, Borneo, bottom temperature 55.8° F. (13.2° C.); and D5585, in 476 fathoms (871 meters), Sibuko Bay, Borneo, bottom temperature 41.1° F. (5° C.). The general distribution should be modified, however, to this extent, that the species is characteristic of the protected waters among the islands of the Archipelago and on the western border along the China Sea, but is not represented at the stations on the eastern coast bordered by the open Pacific. The range in depth is from 18 to 476 fathoms (33 to 871 meters), the average depth 118 fathoms (203 meters), the bottom temperatures ranging from 41.1° F. to 55.8° F. (5° C. to 13.2° C.), average 51.2° F. (10.7° C.).

*Rotalia papillosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14846 | U.S.N.M. | 10+ | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy.m.,s.,sh. | Common. |
| 14847 | U.S.N.M. | 10 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy.s......... | Common. |
| 14850 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N., 15° W., E., 0.30 mile. | 26 | ....... | gn.m.,s..... | Common. |
| 14851 | U.S.N.M. | 9 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne.s......... | Common. |
| 14852 | U.S.N.M. | 4 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s.,sh......... | Few. |
| 14853 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m.,fne.s.... | Common. |
| 14854 | U.S.N.M. | 8 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn.s......... | Common. |
| 14855 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs.s......... | Rare. |
| 14857 | U.S.N.M. | 10 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s.,p.......... | Common. |
| 14859 | U.S.N.M. | 9 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh.,p.,s..... | Common. |
| 14861 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............. | Rare. |
| 14827 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s.,sh......... | Rare. |
| 14832 | U.S.N.M. | 10+ | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy.m......... | Common. |
| | | | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br.s.,Co..... | |
| | | | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy.m......... | |

### ROTALIA PAPILLOSA H. B. Brady, var. COMPRESSIUSCULA H. B. Brady.

Plate 72, figs. 2*a*–*c*.

*Rotalia papillosa* H. B. Brady, var. *compressiuscula* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 708, pl. 107, figs. 1*a*–*c*; pl. 108, figs. 1*a*–*c*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 70, pl. 30, fig. 1.

The variety seems to be slightly more restricted in its range than the typical form, not being recorded to the southward of the Archipelago proper, although well distributed among the islands and in the China Sea. The range of depth is from 16 to 560 fathoms (29 to 1,024 meters), the average depth being 179 fathoms (327 meters). Bottom temperatures range from 50.5° F. to 63.1° F. (10.2° C. to 17.2° C.), the average being 61.1° F. (16.1° C.).

At some of the stations specimens occurred in very considerable numbers, at a few really abundant. Among the stations from which this variety was described by Brady is one *Challenger* station in the Philippines in 95 fathoms (174 meters.) Although the typical form and the variety both occur commonly in shallow water they were most abundant in the Philippine material from 100 to 125 fathoms (183 to 229 meters).

*Rotalia papillosa*, var. *compressiuscula*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 14848 | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Common. |
| 14849 | U.S.N.M. | 10+ | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Common. |
| 14856 | U.S.N.M. | 10+ | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m........... | Common. |
| 14860 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s. p.......... | Common. |
| 14858 | U.S.N.M. | 7 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., sh., co. s. | Few. |
| 14862 | U.S.N.M. | 8 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s.............. | Few. |
| 14828 | U.S.N.M. | 7 | D5385... | 13 24 50 N.; 123 03 70 E... | 32.7 | 62.4 | gy. m........ | Few. |
| 14829 | U.S.N.M. | 9 | D5394... | 12 00 30 N.; 124 05 36 E... | 153 | ....... | gn. m........ | Common. |
| | | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m........ | Rare. |
| 14830 | U.S.N.M. | 2 | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............ | Rare. |
| 14831 | U.S.N.M. | 7 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s.............. | Few. |
| | | | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk. gy. m... | Frequent. |
| | | | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s......... | Few. |
| | | | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s......... | Frequent. |
| | | | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s......... | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Frequent. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m... | Frequent. |
| | | | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m........ | Few. |
| | | | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s. m.......... | Few. |
| | | | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p.... | Frequent. |
| | | | D5301... | 20 37 00 N.; 115 43 00 E... | 208 | 50.5 | gy. m., s.... | Few. |
| | | | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m........ | Few. |
| | | | D5374... | 13 46 44 N.; 121 35 08 E... | 190 | ....... | gy. m........ | Few. |
| | | 1 | D5410... | 10 28 45 N.; 124 05 30 E... | 385 | ....... | gn. m........ | Rare. |
| | | | D5412... | 10 09 15 N.; 123 52 00 E... | 162 | 54.8 | gn. m........ | Frequent. |
| | | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m........ | Rare. |
| | | | D5420... | 9 49 35 N.; 123 45 00 E... | 127 | 59 | ................ | Few. |
| | | 1 | D5443... | 12 43 51 N.; 124 58 50 E... | 241 | 51.3 | co. s., sh.... | Few. |

### ROTALIA SOLDANII d'Orbigny.

Plate 71, figs. 2*a–c*.

*Rotalia* (*Gyroidina*) *soldanii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 278, No. 5; Modèles, 1826, No. 36.

*Rotalia soldanii* HANTKEN, Mitt. Jahrb. ung. geol. Anstalt., 1875, p. 80, pl. 9, figs. 7*a–c*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 706, pl. 107, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 71, pl. 29, fig. 1; pl. 31, fig. 4.

In the Philippine region this species occurs at widely scattered stations, usually not in any considerable numbers. It also keeps to its usual condition of being found in comparatively deep water, the range here being from 78 to 1,560 fathoms (143 to 2,853 meters), the last in the Molucca Sea, average 530 fathoms (969 meters). Bottom temperatures range from 41.2° F. to 73.8° F. (5.1° C. to 23.2° C.), average 52.7° F. (11.4° C.). The localities include Mindoro Strait; off Romblon; between Siquijor and Bohol; between Negros and Siquijor; between Leyte and Mindanao; Sogod Bay, southern Leyte; Pacific Ocean, east coast of Mindanao; Gulf of Davao, Mindanao; north of Tawi Tawi; off Palawan; Darvel Bay, Borneo; Sibuko Bay, Borneo; Molucca Sea; and Macassar Strait.

*Rotalia soldanii*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14839 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 126 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 14841 | U.S.N.M. | 10 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| 14840 | U.S.N.M. | 1 | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m........... | Rare. |
| 14842 | U.S.N.M. | 1 | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s........... | Rare. |
| 14816 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Rare. |
| 14817 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E... | 315 | 52.3 | co. s........ | Rare. |
| 14427 | U.S.N.M. | 5 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m........ | Few. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |
| | | | D5430... | 9 49 40 N.; 119 03 20 E... | 464 | 50.0 | glob. ooze... | Few. |
| | | 1 | D5495... | 9 06 30 N.; 125 00 20 E... | 976 | 52.3 | gy. m........ | Rare. |
| | | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| | | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m........ | Few. |
| | | | D5665... | 4 27 00 S., 118 44 00 E... | 1,008 | ....... | m........... | Few. |

### ROTALIA CALCAR (d'Orbigny).

Plate 71, figs. 3*a*, *b*.

*Calcarina calcar* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 276, No. 1; in De la Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 93, pl. 5, figs. 22-24.
*Rotalia calcar* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 709, pl. 108, fig. 3, fig. 4?—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 69, pl. 28, fig. 2; pl. 29, fig. 2.

This species, which is characteristic of shallow water of coral-reef regions, is abundant under similar conditions in the Philippine Archipelago. Some specimens resemble those figured by Brady; others have longer extensions on the margins of the chambers and become more like *Calcarina*. It is usually associated with *Calcarina*, and there is some question whether or not it should be included in that genus.

*Rotalia calcar*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14878 | U.S.N.M. | 1 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh | Rare. |
| 14879 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| 14880 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 14843 | U.S.N.M. | 2 | D5238... | 7 34 45 N.; 126 38 15 E... | 380 | 43 | gn. m........ | Rare. |
| 14844 | U.S.N.M. | 2 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | p., s., sh.... | Rare. |
| 14845 | U.S.N.M. | 1 | .......... | Cebu.......................... | ....... | ....... | ............ | Rare. |
| 15705 | U.S.N.M. | 1 | .......... | Tara Id........................ | ....... | ....... | ............ | Rare. |
| 15706 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s ....... | Rare. |
| 15707 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E... | 560 | ....... | co. s., m..... | Rare. |
| 15708 | U.S.N.M. | 1 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m....... | Rare. |

### Genus CALCARINA d'Orbigny, 1826.

*Nautilus* (part) Linnaeus, Syst. Nat., ed. 13 (Gmelin's), 1788, p. 3371.
*Calcarina* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 276 (type, *Nautilus spengleri* (Linnaeus)).

*Description.*—Test rotaliform throughout, chambers numerous, close-coiled, biconvex; periphery with radiating spines; chambers of the last-formed coil visible on the ventral side, those of the dorsal side partially hidden by the supplementary skeleton which is more or less developed in all the species; aperture typically a row of small openings along the inner margin of the apertural face; canal system well-developed.

This genus is represented by several recent species, which are confined to the shallow water of the tropics and the Mediterranean. In the Philippine material four species are found, some of them represented by abundant specimens.

A study of the three genera—*Calcarina*, *Baculogypsina*, and *Siderolites*—as well as *Tinoporus* Montfort, has shown very definite relationships. In an earlier short paper I discussed these genera. It seems that the genus *Tinoporus* Montfort is too indefinite to be of value, the species *baculatus* Montfort being now probably recognizable, but as he refers in his generic description to certain characters which belong more closely to what must be, by the study of the characters, now called *Baculogypsina sphaerulata*, the whole genus should be eliminated.

The type species of Calcarina is *Nautilus spengleri* Gmelin. This species is definitely taken as the genotype by d'Orbigny. This is a well-defined species, as will be shown. Of the other species, *C. defrancii*, described by d'Orbigny, is recognizable, and also *C. hispida*, described by H. B. Brady. The fourth species here called *C. baculatus* Montfort makes up the series.

Of the other genera, *Siderolites* Lamarck, of which the type is *S. calcitrapoides* Lamarck from the chalk of Maestricht, seems to have a very definite place. Material from the type locality was studied and shows that the species is much more complex than most of the species of *Calcarina*, and should be used in a definite way for *S. tetraedra* Gümbel, which occurs in the Philippine collections.

*Baculogypsina*, erected by Sacco in 1893 on account of the uncertainty of the identity of Montfort's *Tinoporus*, is here used for *Baculogypsina sphaerulata* (Parker and Jones), which is the species of the *Challenger* report and other works usually passing as *Tinoporus* Montfort.

*Calcarina* has the simplest development of the three and is least specialized, apparently going back geologically to the Cretaceous. The following species occur:

### CALCARINA SPENGLERI (Gmelin).

Plate 75, fig. 1.

*Nautilus spengleri* LINNAEUS, Syst. Nat., ed. 13 (Gmelin's), 1788, p. 3371, No. 10.
*Calcarina spengleri* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 276, No. 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 712, pl. 108, figs. 5, 7.—CUSHMAN, U. S. Nat. Mus., pt. 5, 1915, p. 72, pl. 31, fig. 2.

*Description.*—Test lenticular, biconvex, chambers numerous, in a close-coiled trochoid spire of three or four volutions, each with several chambers, but the sutures not usually all distinguishable on the dorsal side except the last few; wall covered by a supplementary skeleton, the surface with raised tubercles of solid, translucent material, especially in the central part of the disk at either side; peripheral border broadly rounded with a series of blunt, subcylindrical, spinose processes, three to six or more in number, usually five or six; smooth except for the channels of the supplementary canals; aperture a row of rounded pores along the inner margin of the chamber.

Diameter up to 3 mm. or more.

The species is very common in the Philippine collection, especially in warm shallow waters, where it is sometimes very abundant. The depths at which specimens were found range from 16 to 1,092 fathoms (29 to 1,998 meters), with the average depth 173 fathoms (31 meters). Bottom temperatures, where given, range from 51.5° F. to 59° F. (10.8° C. to 15° C.), the average temperature being 51.5° F (10.8 C.).

The stations include the following localities: China Sea, off southern Luzon; Sulu Sea, off western Mindanao; vicinity of Jolo; off northern Cebu; eastern Palawan and vicinity; northern Mindanao and vicinity; Gulf of Tomini, Celebes; south of Patiente Strait; Binang Pool, Subin Bay; and off Cebu.

Linnaeus is usually given as the author of the species, but it apparently was not named until Gmelin's edition, and according to present usage should be given Gmelin's name. There seems to be no question as to what is meant by the Spengler figure of "Ammonshorn" in 1781 which is referred to by Gmelin. In his 1826 work d'Orbigny gives *Tinoporus baculatus* Montfort and *Siderolites calcitrapoides* Lamarck as synonyms of *Calcarina spengleri,* but both seem to be other things as will be discussed later. The *Challenger* figures of this species seem to be excellent.

*Calcarina spengleri—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 12762 | U.S.N.M. | 7 | .......... | Cebu.......... | ...... | ...... | ...... | Common. |
| 12761 | U.S.N.M. | 3 | .......... | Sulu Id.......... | ...... | ...... | ...... | Few. |
| 14511 | U.S.N.M. | 1 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ...... | ...... | Few. |
| 14512 | U.S.N.M. | 10+ | D5106... | 4 23 55 N.; 120 32 33 E... | 37 | ...... | gy.m....... | Common. |
| 14513 | U.S.N.M. | 5 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m.... | Common. |
| 14514 | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ...... | dk. gn. m ... | Common. |
| 14515 | U.S.N.M. | 2 | D5132... | Island off Panabutan Point N.; 15° W., 0.3 mile. | 26 | ...... | gn. m., s..... | Few. |
| 14516 | U.S.N.M. | 3 | D5133... | Island off Panabutan Point N.; 52° E., 1.5 miles. | 38 | ...... | gn. m., s.... | Rare. |
| 14517 | U.S.N.M. | 1 | D5136... | 6 04 20 N ; 120 59 20 E.. | 22 | ...... | s., sh........ | Rare. |
| 14518 | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ...... | co. s., sh..... | Rare. |
| 14519 | U.S.N.M. | 4 | D5152... | 5 22 55 N.; 120 15 45 E . | 34 | ...... | wh. s........ | Rare. |
| 14520 | U.S.N.M. | 4 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ...... | gn. s........ | Few. |
| 14521 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ...... | fne.s.,blk.sp | Few. |
| 14737 | U.S.N.M. | 10 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ...... | crs. s........ | Common. |
| 14522 | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ...... | co., s., m.... | Rare. |
| 14533 | U.S.N.M. | 1 | D5429... | 9 41 30 N.; 118 50 22 E... | 766 | ...... | gn. m....... | Rare. |
| 14534 | U.S.N.M. | 5 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., co..... | Common. |
| 14535 | U.S.N.M. | 5 | D5523... | 8 48 44 N.; 123 27 35 E... | ...... | ...... | ...... | Common. |
| 14536 | U.S.N.M. | 1 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co... | Few. |
| 14537 | U.S.N.M. | 1 | D5609... | 0 11 00 S.; 121 16 00 E.. | 1,092 | 36.3 | gn. m....... | Rare. |
| 14538 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ...... | co. s., m..... | Rare. |
| 14539 | U.S.N.M. | 8 | .......... | Binang Pool, Subin Bay, P. I. | ...... | ...... | ...... | Common. |
| 14738 | U.S.N.M. | 9 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ...... | sh., p., s..... | Common. |
| 14739 | U.S.N.M. | 1 | D5291... | 13 29 40 N.; 121 00 45 E... | 173 | 51.5 | fne. bk. s.... | Rare. |

### CALCARINA DEFRANCII d'Orbigny.

Plate 75, fig. 2.

*Calcarina defrancii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 276, pl. 13, figs. 5–7.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 714, pl. 108, figs. 6a–c.—MILLETT, Journ. Roy. Micr. Soc., 1904, p. 598.—FORNASINI, Mem. Accad. Sci. Bologna, ser. 6, vol. 5, 1908, p. 7, pl. 3, figs. 3, 4.

*Calcarina spengleri*, var., CARPENTER, PARKER, and JONES, Introd. Foram., 1862, p. 217, pl. 14, fig. 2, figs. 34 A–G in text.—PARKER and JONES, Ann. Mag. Nat. Hist., ser. 3, vol. 12, 1863, p. 439, No. 6.

*Description*.—Test lenticular, biconvex, chambers numerous in a close-coiled, flattened, trochoid spire of about three volutions, each with several chambers; the sutures distinct on the ventral side, but much obscured or obsolete on the dorsal side, the spire, however, usually distinct; wall, especially on the dorsal side, covered by a supplementary skeleton, the surface with spinose tubercles; peripheral border bluntly angled, with a series of elongate spines, generally cylindrical; the outer ends blunt, typically one spine from the outer end of each chamber, channeled longitudinally; the neighboring spines of the different whorls often fusing near the base and the free ends continuing their direction make an apparent bifurcating spine; aperture at the base of the last-formed chamber.

Diameter up to 2.5 mm. or more.

The species is very common at a few stations, most of which are in shallow, quiet water, and it is evident that its best development is in such localities. D'Orbigny's original specimens were from the Red Sea. Brady had his best specimens from off the Admiralty Islands in 15 to 25 fathoms (27 to 46 meters). Millett gives the following:

> In the Malay Archipelago this is the most abundant species of the genus.

Fornasini in figuring the tracings of the "planchés inédites" gives more bizarre forms than the *Challenger* or d'Orbigny's originals, and figures one specimen with decidedly forked tips to the spines. Carpenter also figures similar specimens as the "Philippine variety of *Calcarina*," and in his text clearly shows that *C. defrancii* is much more abundant in the Philippines than in the Mediterranean.

In the Philippine collections this has occurred at the following localities: China Sea, off southern Luzon; Sulu Sea, off western Mindanao; Sulu Archipelago; Tawi Tawi Group, between Panay and Negros; Tanon Strait; Pujuda Bay and vicinity; Gulf of Davao; Palawan Passage; Ragay Gulf; Luzon, between Burias and Luzon; Buton Strait; and Binang Pool, Subin Bay.

The range in depth is from 18 to 565 fathoms (33 to 1,033 meters), and the bottom temperatures, where given, range from 46.2° F. to 79.5° F. (7.8° C. to 26.3° C.).

It is evident that in the Philippine and Malay regions this is a very abundant species.

*Calcarina defrancii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14491 | U.S.N.M. | 2 | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s., sh. | Rare. |
| 14492 | U.S.N.M. | 2 | D5106... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | ............... | Rare. |
| 14493 | U.S.N.M. | 6 | D5132... | Island off Panabutan Point, N.; 15° W., 0.3 mile. | 26 | ....... | gn. m., s .... | Few. |
| 14494 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point N.; 52° E. 1.5 miles. | 28 | 79.5 | gn. m., s .... | Common. |
| 14495 | U.S.N.M. | 10 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Common. |
| 14496 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Rare. |
| 14497 | U.S.N.M. | 3 | D5184... | 10 18 30 N.; 122 23 30 E... | 565 | 49.8 | gn. m ....... | Rare. |
| 14498 | U.S.N.M. | 2 | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn. m........ | Rare. |
| 15374 | U.S.N.M. | 2 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Rare. |
| 14499 | U.S.N.M. | 5 | D5244... | 6 52 05 N.; 126 14 15 E... | 171 | ....... | gy. m........ | Few. |
| 14500 | U.S.N.M. | 1 | D5260... | 7 05 07 N.; 126 39 45 E... | 28 | ....... | Co., s........ | Rare. |
| 14501 | U.S.N.M. | 5 | D5255... | 7 03 00 N.; 126 39 00 E... | 100 | ....... | sft. m........ | Few. |
| 14502 | U.S.N.M. | 6 | D5276... | 13 49 15 N.; 120 14 15 E... | 18 | ....... | sh., p., s..... | Few. |
| 14503 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s..... | Rare. |
| 14505 | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m .... | Rare. |
| 14506 | U.S.N.M. | 2 | D5358... | 6 06 40 N.; 118 18 15 E... | 39 | ....... | m........... | Rare. |
| 14507 | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Rare. |
| 14504 | U.S.N.M. | 1 | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m ... | Rare. |
| 14508 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m........ | Rare. |
| 14509 | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh .. | Few. |
| 14510 | U.S.N.M. | 6 | .......... | Binang Pool, Subin Bay, P. I. | ....... | ....... | ............... | Few. |

### CALCARINA BACULATUS (?) (Montfort).

Plate 75, fig. 3.

*Tinoporus baculatus* Montfort (part), Conch. Syst., vol. 1, 1808, p. 146.
*Calcarina baculatus* (?) (Montfort), Bull. 100, U. S. Nat. Mus., vol. 1, pt. 6, 1919
p. 364, pl. 44, fig. 3.

*Description.*—Test lenticular, biconvex, chambers numerous, in closely coiled test, periphery rounded; supplementary skeleton well developed, dorsal and ventral surfaces with numerous small knobs o bosses with finer spines between; periphery with three or four shor cylindrical, truncate spines, placed at equidistant points on the sur face; surface of the spines covered with spinose projections.

Diameter up to 2 mm. or slightly more.

Montfort's localities for this species are the East Indies, Arabia Sea, and the Adriatic. He figures a rounded test with three cylin drical, truncate spinose projections at three of four equidistant point of the circumference, the exterior of the test black with white point on both the body and spines. This has been referred to *Tinoporu baculatus* with the description which in the remarks given make note of the color as "blanche, flambée, et teintée de jaune." This which is evidently not descriptive of the figured specimen, probabl refers to the *Tinoporus* of most authors, which is here referred to a *Baculogypsina sphaerulatus*. The figured specimen, however, i evidently a *Calcarina*, as at one Philippine station especially (D5134 Sulu Archipelago, near Basilan Island), specimens were found exactl like the crude figure of Montfort, dark brown and black with spine appearing as light spots and the spinose projections as in the figur and at equidistant points on the periphery. A study of the young and the development of older specimens of the same type from this locality show it to be a *Calcarina*. The name *baculatus* may be used probably to distinguish this species, although as to the generic portion it is very questionable as to its clearness and therefore its availability.

In its development it is seen that this species of *Calcarina* has a considerable development of supplementary skeleton, which, as in *C. hispida*, hides most of the earlier portion of the test.

Specimens referred to in this species were found in the Philippine collections from Jolo Jolo, Sulu Archipelago, vicinity of Siasi; Tawi Tawi Group; off Romblon; off eastern Panay; between Burias and Luzon; Pacific Ocean; east coast of Mindanao; Gulf of Davao; China Sea, off southern Luzon; Palawan Passage; Marinduque Island and vicinity; east coast of Luzon; north of Tawi Tawi; and Sibuko Bay, Borneo.

These are mostly in the southern portion of the Archipelago in shallow, warm water.

This species should be carefully distinguished and its occurrence recorded that more may be known of its actual distribution.

*Calcarina baculatus (?)—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ........ | fne. s........ | Common. |
| [illegible] | U.S.N.M. | 10+ | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ........ | s., sh........ | Common. |
| [illegible] | U.S.N.M. | 10+ | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ........ | s., Co ....... | Common. |
| [illegible] | U.S.N.M. | 7 | D5139... | 6 06 00 N.; 120 02 30 E... | 20 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 5 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ........ | co. s., sh.... | Common. |
| [illegible] | U.S.N.M. | 4 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ........ | co. s., sh.... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 3 | D5149... | 5 33 00 N.; 120 42 10 E... | 10 | ........ | co. sh........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ........ | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ........ | wh. s......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ........ | s............. | Common. |
| [illegible] | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ........ | fne. s........ | Rare. |
| [illegible] | U.S.N.M. | 5 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ........ | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 6 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| [illegible] | U.S.N.M. | 6 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ........ | m., fne. s.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5182... | 11 30 40 N.; 123 23 20 E... | 24 | ........ | fne. s., m.... | Few. |
| [illegible] | U.S.N.M. | 8 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ........ | co. s......... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5250... | 7 05 07 N.; 125 39 45 E... | 23 | ........ | co. s......... | Common. |
| [illegible] | U.S.N.M. | 4 | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ........ | sft. m........ | Few. |
| [illegible] | U.S.N.M. | 6 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ........ | sh., p., s.... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne. s., m., sh | Common. |
| [illegible] | U.S.N.M. | 7 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ........ | gy. m......... | Common. |
| [illegible] | U.S.N.M. | 1 | D5371... | 13 49 40 N.; 121 40 15 E... | 83 | ........ | gn. m......... | Rare. |
| 14486 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ........ | gy. m......... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5576... | 5 25 56 N.; 120 08 30 E... | 277 | 53.3 | s............. | Few. |
| 14489 | U.S.N.M. | 10+ | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne. gy. s., gy. m. | Common. |
| 14490 | U.S.N.M. | 1 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m....... | Rare. |

### CALCARINA HISPIDA H. B. Brady.

Plate 75, fig. 4.

*Calcarina spengleri*, hispid variety, Carpenter, Philos. Trans., vol. 150, 1860, p. 551, pl. 19, figs. 8–11; pl. 20, figs. 6, 8; Introd. Foram., 1862, pl. 14, figs. 6, 7.

*Calcarina hispida* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 713, pl. 108, figs. 8, 9.—Lister, Philos. Trans., vol. 186, 1895, p. 437, pl. 8, figs. 34–37.—Millett, Journ. Roy. Micr. Soc., 1904, p. 597.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 72, pl. 29, figs. 4, 5; pl. 31, fig. 3.

*Calcarina calcar*, var. *hispida*, Carter, Ann. Mag. Nat. Hist., ser. 5, vol. 5, 1880, p. 453.

*Calcarina quoyi* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 276, No. 6.—Fornasini, Mem. Accad. Sci. Bologna, ser. 6, vol. 5, 1908, p. 7, pl. 3, figs. 8, 9.

*Description.*—Test lenticular, biconvex, chambers numerous, in a close-coiled, generally flattened trochoid spire, of about three volutions, each with several chambers; the sutures indistinct, as well as the line of the spire, due to the great development of a supplementary skeleton, only the last two or three chambers being at all distinguishable from either side; as formed these are rounded with a thin, finely perforate wall; the general surface of the test very rough and hispid, with short flattened spines, projecting radially and often covering the spines as well; periphery of the test with a few spines which are usually somewhat flattened and short, widest at the base; aperture a series of pores at the base of the last-formed chamber.

Diameter up to 2 mm.

Brady originally described this species from among the islands of the Pacific, one station at 155 fathoms (283 meters), the remainder ranging from 3 fathoms (5 meters) or less to 37 fathoms (68 meters). Millett gives it from the Malay Archipelago with the note:

> The examples are neither numerous or large.

In the Philippines it occurs at the following localities: China Sea, off southern Luzon; vicinity of Jolo, Sulu Archipelago; Tawi Tawi Group; off Romblon; between Panay and Negros; Sogod Bay; southern Leyte; between Marinduque and Luzon; Gulf of Davao; between Bohol and Cebu; east coast of Luzon; Darvel Bay, Borneo; and Binang Pool, Subin Bay.

The newly added chambers in this species are added directly on top of the hispid secondary skeleton, and this is produced so rapidly that rarely more than two chambers in the series retain their original surface before being so covered.

From the evidence of the "planchés inédites" d'Orbigny's *Calcarina quoyi* seems to be the same as *C. hispida* H. B. Brady; but as the former could not have been identified until the publication of the figures by Fornasini in 1907, it must remain a synonym of *C. hispida*.

*Calcarina hispida*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1630 | U.S.N.M. | 7 | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m... | Common. |
| 1631 | U.S.N.M. | 8 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh........ | Common. |
| [illegible] | U.S.N.M. | 2 | D5148... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Few. |
| [illegible] | U.S.N.M. | 2 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Few. |
| 1634 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh.... | Common. |
| 1635 | U.S.N.M. | 3 | D5161... | 5 10 15 N.; 119 53 00 E.. | 16 | ....... | fne. s., blk. sp. | Few. |
| 1636 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Common. |
| 1637 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s... | Common. |
| 1639 | U.S.N.M. | 10+ | D5184... | 10 18 30 N.; 122 23 30 E.. | 565 | 49.8 | gn. m........ | Common. |
| 1640 | U.S.N.M. | 4 | D5191... | 10 29 45 N.; 123 31 15 E.. | 256 | 62.8 | gn. m........ | Few. |
| 1641 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| 1642 | U.S.N.M. | 5 | D5220... | 13 38 00 N.; 121 56 00 E.. | 50 | ....... | sft. gn. m.... | Few. |
| 1643 | U.S.N.M. | 1 | D5250... | 7 05 07 N.; 125 39 45 E.. | 23 | ....... | co. s......... | Rare. |
| 1638 | U.S.N.M. | 10+ | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. gy. s..... | Common. |
| 1644 | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Rare. |
| 1645 | U.S.N.M. | 2 | D5412... | 10 09 15 N.; 123 52 00 E.. | 162 | 54.8 | gn. m........ | Rare. |
| 1646 | U.S.N.M. | 1 | D5459... | 13 10 21 N.; 123 59 54 E.. | 201 | ....... | .............. | Rare. |
| 1647 | U.S.N.M. | 2 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 56.8 | br. s., Co... | Rare. |
| 1648 | U.S.N.M. | 10+ | .......... | Binang Pool, Subin Bay, P. I. | ....... | ....... | .............. | Common. |
| 1649 | U.S.N.M. | 3 | .......... | Jolo Jolo, P. I.............. | ....... | ....... | .............. | Few. |

## Genus SIDEROLITES Lamarck, 1801.

*Siderolites* LAMARCK, Syst. Anim. sans Vert., 1801, p. 376 (type, *S. calcitrapoides* Lamarck).

From a study of material from Maestricht, the type locality for this genus, and the type species, it is evident that the genus *Siderolites* can be used in the present case. It is a test much like *Calcarina* but with a more accelerated development. The early chambers are close-coiled, rotaliform, then later with numerous large, irregular chambers, coarsely punctate, between which as support to this loose tissue are large bosses, starting near the center and growing radially to the periphery, made of solid shelly material, not very evident in well-preserved specimens, but becoming very distinct when erosion takes place; the periphery usually with three or four blunt spines, not in one place, but extending radially; apertures in the young, as in *Calcarina*, but in the adult formed by the coarse perforations of the outer chambers.

This is the genus to which it seems the *Calcarina tetraedra* of Gümbel should be referred, as well as the common Philippine species which seems to be identical with Gümbel's species. The genus goes back at least to the Eocene, and in the present oceans seems to be limited so far as is known to the general Philippine region.

Carpenter [24] figures well the characteristic structure of this genus, which he refers to as "Philippine variety" of *Tinoporus baculatus*.

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[24] Introd. Foram., 1862, pl. 15, fig. 10.

### SIDEROLITES TETRAEDRA (Gümbel).

Plate 75, fig. 5; plate 76, figs. 1–5.

*Calcarina tetraedra* Gümbel, Abh. bay. Akad. Wiss., vol. 10, 1868 (1870), p. 65 pl. 2, figs. 97*a*, *b*.

*Siderolites tetraedra* Cushman, Bull. 100, U. S. Nat. Mus., vol. 1, pt. 6, 1919, pl 44, fig. 5; pl. 45, figs. 1–5.

*Description.*—Test in the young, biconvex, rotaliform, compose of two or more volutions, with several chambers in each; later th supplementary skeleton greatly developed and the exterior wit irregularly placed chambers, subglobular in shape and with coarsel perforated walls; between the chambers, solid radial portions givin support to the remainder of the test, and at four or five (usually fou points thick tapering, bluntly pointed spinose projections are place having their initiation in the early portion of the test, in the adul these often covered nearly to the tips with the supplementary skele ton, in such cases the whole test instead of spherical being concav and polyhedral; aperture in the young at the base of the chambe in the adult formed by the large perforations of the chamber wall.

Diameter up to 6 mm.

In the Philippine collections this species is often very abundan in all its stages. It is most common in warm, shallow water. I has occurred at the following localities: Jolo Jolo; off Romblo between Burias and Luzon; China Sea, off southern Luzon; Malan paya Sound; Palawan Island; north of Tawi Tawi; and Darv Bay, Borneo.

There seems to be little to separate this species from that describe from the Eocene by Gümbel. The four tapering spines are ver characteristic. Various stages in the development of the speci are shown on plate 76, from the early *Calcarina* stage through th development of a few of the irregular chambers and gradually th covering of the surface with these. An eroded specimen is shown i figure 4, where the chambers of the exterior have been partiall broken away leaving the heavier solid supporting portions as pr jections.

Carpenter figures this species as a "Philippine variety" of *Tin porus baculatus*,[28] and makes notes of its differences from the "Au tralian variety" (*Baculogypsina sphaerulatus*). He showed th differences in the structure of the interior also.

From what I have seen of this species it is very common in th Philippines, but rare elsewhere, while the following genus and specie is rare in the Philippines but very abundant in the southern regio about Australia especially.

In its development *Siderolites* stands between *Calcarina* and *Baculo gypsina*, and geologically also its first occurrence is between the tw as far as is known.

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[28] Introd. Foram., 1862, pl. 15, figs. 8–10.

*Siderolites tetraedra*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 4 | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh.... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5149... | 5 33 00 N.; 120 42 10 E... | 10 | ....... | co., sh....... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s........ | Common. |
| [illegible] | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s....... | Common. |
| [illegible] | U.S.N.M. | 7 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Common. |
| [illegible]<br>[illegible] | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 15 E... | 18 | ....... | sh., p., s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 7 | D5342... | 10 56 55 N.; 119 17 24 E... | 14–25 | ....... | gy. m....... | Common. |
| [illegible] | U.S.N.M. | 9 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh....... | Common. |
| [illegible] | U.S.N.M. | 2 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5589... | 4 12 10 N.; 118 38 08 E... | 260 | 45.7 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | Common. |
| [illegible] | U.S.N.M. | 2 | D5220... | 13 38 00 N.; 121 58 00 E... | 60 | ....... | sft. gn. m... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m....... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5391... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s......... | Rare. |

### Genus BACULOGYPSINA Sacco, 1893.

*Description.*—Test in the very young, rotaliform, later irregular, with numerous small finely punctate chambers, with four to eight or even more sharp tapering spines; supplementary skeleton greatly developed, at the surface, when well preserved, with bosses of clear shell material united with surrounding ones by radial connecting portions of the same sort of material, making a reticulate marking standing out slightly above the surface.

This genus represents the single living species which is found in enormous numbers in the southern islands, especially off Australia, but is rare in the Philippines.

In its development *Baculogypsina* is more accelerated than *Calcarina* and *Siderolites*, and evidently represents a higher and later development in the same series.

#### BACULOGYPSINA SPHAERULATUS (Parker and Jones).

Plate 75, fig. 6.

*Baculogypsina sphaerulatus* CUSHMAN, Bull. 100, U. S. Nat. Mus., vol. 1, pt. 6, 1919, pl. 44, fig. 6.

*Description.*—Test generally biconvex, the periphery somewhat acute, with four to eight or more rather sharp short spines, surface covered with a reticulated pattern of slightly projecting bosses, with connecting lines of clear shell material; early development consisting of one volution or slightly more of numerous chambers coiled as in *Calcarina*, after which the supplementary chambers are filled in rapidly on the surface, and the network of bosses and connecting rods built up; the radial spines are always smooth except for the slight channeling of the surface; color in fresh material often orange or yellow.

Diameter up to 3 mm.

From all the Philippine collections examined this has been found but a few times, and then in small numbers. It is abundant farther south, especially in the South Pacific islands and off Australia, from where I have had abundant material. Millett records it as very rare in the Malay Archipelago collections, finding it at but one station. This accords with the results I have had from the Philippines and with Carpenter, who speaks of it as—

> found in greatest size and abundance in the Australian and Polynesian Seas, occurrin chiefly in the shelly sands of rather shallow water; and * * * does not appear t range far beyond those regions.

## Genus GYPSINA Carter, 1877.

### GYPSINA GLOBULUS (Reuss).

*Ceriopora globulus* Reuss, Haidinger's Nat. Abh., vol. 2, 1847, p. 33, pl. 5, fig. 7.

*Gypsina globulus* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 717, pl. 101, fig. 8.—Chapman, Proc. Zool. Soc., London, 1895, p. 44; Journ. Linn. Soc. London, Zoology, vol. 28, 1900, p. 198.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31, pt. 64, 1913, p. 140, pl. 13, fig. 10; Trans. Zool. Soc. London, vol. 20, 1915, p. 727.

*Description.*—Test spherical or generally globular; surface regularly pitted with a more or less regular polygonal network; earliest chambers spiral, followed quickly by a mass of chambers covering the entire exterior; outer chamber walls finely perforated, forming the aperture of the test; color white.

Diameter up to 4 mm.

Specimens have not been at all abundant in the Philippine collections. There are records from five stations from the following localities: Sulu Archipelago, off Tawi Tawi; off Jolo; off Romblon; and off eastern Panay. These range in depth from 24 to 318 fathoms (44 to 582 meters), three of them in less than 35 fathoms (66 meters).

*Gypsina globulus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5151... | 5 24 40 N.; 120 27 15..... | 24 | ....... | co. s., sh.... | Few. |
| 12493 | U.S.N.M. | 9 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Common. |
| 12492 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| 15763 | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| 12495 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s.... | Few. |

## Genus CARPENTERIA Gray, 1858.

### CARPENTERIA UTRICULARIS (Carter).

Plate 73, figs. 4, 5.

*Polytrema utricularis* Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 17, 1876, p. 211, pl. 13, figs. 11–17.

*Carpenteria utricularis* CARTER, Ann. Mag. Nat. Hist., ser. 4, vol. 20, 1877, p. 176.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 678, pl. 99, figs. 6, 7; pl. 100, figs. 1-4.

This species, which was found by the *Challenger* in its best development off the Admiralty Islands, and which are allied in their faunal characters with that of the Philippines, has occurred at two stations in the Sulu Archipelago, D5146, off Siasi, in 24 fathoms (44 meters), and D5154, off Tawi Tawi, in 12 fathoms (22 meters). The specimens were not common.

*Carpenteria utricularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh..... | Few. |
| | | | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s......... | Few. |

### CARPENTERIA PROTEIFORMIS Goës.

Plate 73, figs. 2, 3.

*Carpenteria balaniformis*, var. *proteiformis* GOËS, Kongl. Svensk. Vet. Akad. Handl., vol. 19, 1882, p. 94, pl. 6, figs. 208-214; pl. 7, figs. 215-219.

*Carpenteria proteiformis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 679, pl. 97, figs. 8-14.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 49, pl. 20, fig. 2; pl. 21, fig. 1.

This species seems to be a common one in the Philippine material. It is a characteristic species of the coral-reef regions, and is also found to considerable depth. There seem to be two forms which are characterized by the ornamentation of the test. One of these has the test with coarse reticulate ornamentation and large intermediate portions; the other is very thinly perforate. This latter form occasionally has a secondary thinning of the wall, developing large papillae.

Similar specimens are found in the region about New Zealand, and the two may represent distinct species.

This species has been found at 25 stations in the area, abundant at some of them; these range in depth from 18 to 890 fathoms (33 to 1,628 meters), the average depth being 190 fathoms (348 meters).

Bottom temperatures range from 46.2° F. to 75.7° F. (7.8° C. to 24.2° C.), with the average 54.6° F. (12.5° C.). These stations are mostly in the region of the Archipelago, although it is common in the Sulu region and also to the southward in Darvel Bay, Borneo, and Buton Strait.

*Carpenteria proteiformis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | °F. | | |
| 11929 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N.; 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Common. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 15696 | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Frequent. |
| 11933 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Rare. |
| 11930<br>11935 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Common. |
| 11927 | U.S.N.M. | 1 | D5213... | 12 15 00 N.; 123 57 30 E.. | 80 | ....... | s., m., sh.... | Rare. |
| 11936 | U.S.N.M. | 7 | D5276... | 13 49 15 N.; 120 14 15 E.. | 18 | ....... | sh., p., s..... | Few. |
| 11934 | U.S.N.M. | 4 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Few. |
| 11928 | U.S.N.M. | 10+ | D5336... | 11 37 45 N.; 119 46 00 E.. | 46 | ....... | s., m........ | Common. |
| 11931 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 25 E.. | 43 | ....... | Co., s., m... | Common. |
| 11926 | U.S.N.M. | 8 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh........... | Common. |
| 11925 | U.S.N.M. | 7 | D5571... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.3 | s., sh........ | Few. |
| 15698 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Rare. |
| 11964 | U.S.N.M. | 4 | D5579... | 4 54 15 N.; 119 00 52 E.. | 175 | 55.3 | fne. s., Co... | Rare. |
| 15701 | U.S.N.M. | 4 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 13216 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E.. | 890 | 38.3 | gy. m., fne. s. | Rare. |
| 13217 | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh... | Rare. |
| 11932 | U.S.N.M. | 3 | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m........ | Rare. |
| | | | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s..... | Few. |
| | | | D5132... | Island off Panabutan Point, N.; 15° W., 0.3 mile. | 26 | ....... | gr. m., s..... | Frequent. |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Frequent. |
| | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 30 00 E.. | 100 | ....... | sft. m........ | Rare. |
| 15697 | U.S.N.M. | 1 | D5426... | 9 12 00 N.; 118 28 00 E.. | 27 | ....... | fne. gy. s.... | Rare. |
| 15699 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E.. | 300 | ....... | gn. m........ | Rare. |
| 15700 | U.S.N.M. | 2 | D5574... | 5 30 45 N.; 120 07 57 E.. | 340 | ....... | ................. | Rare. |

### CARPENTERIA MONTICULARIS Carter.

*Carpenteria monticularis* Carter, Ann. Mag. Nat. Hist., ser. 4, vol. 19, 1877, p. 211, pl. 13, figs. 9–12.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 677, pl. 99, figs. 1–5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 48, pl. 20, fig. 3.

The specimens are very typical but not common in the area. Some of these are fine and large and agree very closely with the specimens figured by Brady (*Challenger*, pl. 99, figs. 1–5).

These occurred at the following stations: D5154, off Tawi Tawi, 12 fathoms (22 meters); D5192, off northern Cebu, 32 fathoms (59 meters); D5217, between Burias and Luzon, 105 fathoms (193 meters); and D5269, Verde Island Passage, 220 fathoms (403 meters).

*Carpenteria monticularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15692 | U.S.N.M. | 2 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s.......... | Rare. |
| | | | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s.......... | |
| 15693 | U.S.N.M. | 1 | D5217... | 13 00 20 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Rare. |
| | | | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p.... | |

### CARPENTERIA RHAPHIDODENDRON Moebius.

*Carpenteria rhaphidodendron* Moebius, Beitr. Meeresfauna Insel. Mauritius, 1880, p. 81, pl. 5, figs. 6–10; pl. 6, figs. 1–6.

*Ramulina herdmani* Dakin, Ceylon Pearl Oyster Fisheries, Suppl. Rept., pt. 5, 1906, p. 236, pl., figs. 1–6, text figs. p. 227.

This species, which seems to be rare in the Indo-Pacific region about coral reefs, is recorded by Chapman from Funafuti, and occurs in the Philippine region from *Albatross* station D5154, Sulu Archipelago, off Tawi Tawi, in 12 fathoms (22 meters), and is very common at D5357, north of Balabac Strait, 68 fathoms (125 meters). This is a very peculiar species, at first not resembling the foraminifera, but apparently belonging to this genus. Some of the largest specimens measure nearly 20 mm. in height. Figures given by Chapman show well the characters of its form and arrangement of chambers. The big rootlike offset chambers are characteristic in all the large specimens, apparently having a definite use in supporting the rest of the column. This is probably the same as the species described by Dakin[37] from off Ceylon, as a comparison of his figures will show.

*Carpenteria rhaphidodendron—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15304 | U.S.N.M. | 2 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | Co. s........ | Rare. |
| 15305 | U.S.N.M. | 10+ | D5357... | 8 06 00 N.; 117 17 10 E... | 68 | ....... | Co., s....... | Frequent. |

## Genus POLYTREMA Risso, 1826.

### POLYTREMA MINIACEUM (Gmelin).

*Millepora miniacea* Linnaeus, Syst. Nat., ed. 13 (Gmelin's), vol. 1, pt. 6, 1788, p. 3784, No. 6.

*Polytrema miniaceum* Blainville, Dict. Sci. Nat., vol. 42, 1826, Atlas, Zooph., vol. 1, p. 17.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 721, pl. 100, figs. 5–9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 5, 1915, p. 75, pl. 18, fig. 6; pl. 20, fig. 4.—Hickson, Trans. Linn. Soc. London, Zoology, vol. 14, 1911, p. 453, pl. 30, fig. 1; pl. 31, fig. 8; pl. 32, figs. 18, 23, 27, 31.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 728.

This species, which is characteristic of coral-reef regions, is very common, attached to shell fragments and other objects in shallow water, except in the southern part of the Archipelago. Although probably widely distributed in the region it has been recorded and material saved from the following stations: D5146, Sulu Archipelago, off Siasi, 24 fathoms (44 meters); D5179, off Romblon, 37 fathoms (68 meters); D5217, between Burias and Luzon, abundant at 105 fathoms (193 meters); and D5357, north of Balabac Strait, 68 fathoms

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[37] Ceylon Pearl Oyster Fisheries, Suppl. Rep., pt. 5, 1906.

(125 meters). Some of the specimens are nearly white in color, but most of them are of the reddish color characteristic of the species.

*Polytrema miniaceum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 15689 | U.S.N.M. | 2 | D5146... | 5 45 40 N.; 120 48 50 E... | 24 | ....... | co. s., sh.... | Rare. |
| 15764 | U.S.N.M. | 5 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 15690 | U.S.N.M. | 10+ | D5217... | 13 20 00 N., 123 14 15 E... | 165 | 63.1 | crs. gy. s.... | Frequent. |
| 15691 | U.S.N.M. | 3 | D5357... | 8 06 00 N.; 117 17 10 E... | 68 | ....... | Co., s ....... | Rare. |

### Genus HOMOTREMA Hickson, 1911.

This genus has been separated by Hickson from *Polytrema* on the basis of the structure of the test. The Philippine material carries out the points of structure which he discusses in the fullest manner. The following is the generic description given by Hickson:

> The surface is marked by clearly defined areolae about 0.1 mm. in diameter, perforated by a large number of small foramina, 0.001 mm. in diameter. The boundaries of the areolae are solid, and there are no pillar pores. Below the surface there may be seen a number of chambers communicating with one another by large open passages and bounded by solid walls. There are no hollow pillars and no foramina except those on the outer walls of the superficial chambers.

#### HOMOTREMA RUBRUM (Lamarck).

*Millepora rubra* LAMARCK, Anim. sans Vert., vol. 2, 1816, p. 202.

*Polytrema rubra* CARPENTER, PARKER, and JONES, Introd. Foram., 1862, p. 235, pl. 13, figs. 18–20.

*Homotrema rubrum* HICKSON, Trans. Linn. Soc. London, Zoology, vol. 14, 1911, p. 454, pl. 30, fig. 2; pl. 31, fig. 9; pl. 32, figs. 19, 22, 28.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 729.

The Philippine material, although occurring at a few stations as far as the available material shows, is very characteristic, having the form and the deep red color as well as the finer structure of the species, as suggested by Hickson. The records include the following four stations: D5109, China Sea off southern Luzon, 10 fathoms (18 meters); D5136, vicinity of Jolo, 22 fathoms (40 meters); D5146, Sulu Archipelago off Siasi, 24 fathoms (44 meters); and D5179, off Romblon, 37 fathoms (68 meters).

*Homotrema rubrum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | | | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co .......... | |
| 15686 | U.S.N.M. | 2 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh........ | Rare. |
| 15687 | U.S.N.M. | 10+ | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh..... | Frequent. |
| 15688 | U.S.N.M. | 8 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Frequent. |

### Genus SPORADOTREMA Hickson, 1911.

The original description by Hickson is as follows:

> The surface of the stem, and, in many cases, of the proximal parts of the branches as well, are not marked by areolae at all. The foramina are scattered irregularly on the surface and are of relatively large size. There are no pillar pores. Below the surface there may be seen a number of chambers communicating with one anothe by large open passages and bounded by solid walls. There are no hollow pillars and no foramina except those on the outer walls of the superficial chambers.

#### SPORADOTREMA CYLINDRICUM (Carter).

*Polytrema cylindrica* CARTER, Ann. Mag. Nat. Hist., ser. 5, vol. 5, 1880, p. 441, pl. 18, figs. 1*a–g*.

*Sporadotrema cylindricum* HICKSON, Trans. Linn. Soc. London, Zoology, vol. 14, 1911, p. 454, pl. 30, figs. 3, 4, 6, 7; pl. 31, figs. 10, 13–16; pl. 32, figs. 20, 21, 24, 29, 32, 33.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 729.

The Philippine specimens of this species show the orange-yellow color characteristic of this species, as described and figured by Hickson. As far as the records show the species is not common and a few specimens have been found at the following stations: D5146, Sulu Archipelago off Siasi, 24 fathoms (44 meters); D5179, off Romblon, 37 fathoms (68 meters); and D5357, north of Balabac Strait, 68 fathoms (125 meters).

This genus can be easily distinguished through the generic description given by Hickson preceding this.

*Sporadotrema cylindricum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15663 | U.S.N.M. | 1 | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh..... | Rare. |
| 15664 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Rare. |
| 15665 | U.S.N.M. | 2 | D5357... | 8 06 00 N.; 117 17 10 E.. | 68 | ....... | Co., s ....... | Rare. |

## Family NUMMULITIDAE.

### Genus NONIONINA d'Orbigny, 1826.

#### NONIONINA UMBILICATULA (Montagu.)

Plate 74, figs. 3*a*, *b*.

*Nautilus umbilicatulus* MONTAGU, Test. Brit., 1803, p. 191.

*Nonionina umbilicatula* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 242, pl. 12, fig. 157.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 726, pl. 109, figs. 8, 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 24, pl. 17, fig. 1.

Rather typical specimens of this species occurred at 13 stations in the region, ranging in depth from 105 to 500 fathoms (193 to 914 meters), the average depth being 302 fathoms (550 meters). Bottom temperatures are given for 8 of these stations, ranging from 41.2° F. to 63.1° F. (5.1° C. to 17.2° C.), the average temperature being 51.1° F. (10.6° C.).

Besides the few stations in the Archipelago this has also occurred off Darvel Bay, between Gillolo and Makyan Islands, and in Macassar Strait.

*Nonionina umbilicatula—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15528 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh... | Rare. |
| 15529 | U.S.N.M. | 1 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| 15530 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 15531 | U.S.N.M. | 8 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Frequent. |
| 15532 | U.S.N.M. | 6 | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ....... | gy. m., s.... | Frequent. |
| 15533 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Rare. |
| 15534 | U.S.N.M. | 3 | D5445... | 12 44 42 N.; 124 59 50 E.. | 383 | 44.3 | gn. m., s.... | Rare. |
| 15535 | U.S.N.M. | 3 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m.(net). | Few. |
| 15536 | U.S.N.M. | 6 | D5565... | 5 51 42 N.; 120 30 30 E., | 243 | 52.3 | s., ptr. sh... | Frequent. |
| 15537 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............. | Rare. |
| 15538 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | bk. s., Co ... | Rare. |
| 15539 | U.S.N.M. | 2 | D5622... | Makyan Island, N. 9° E.. | 275 | ....... | gy. m........ | Rare. |
| 15540 | U.S.N.M. | 2 | D5667... | 2 56 00 S.; 118 47 30 E.. | 367 | 41.7 | gy. s., m.... | Rare. |

## NONIONINA POMPILIOIDES (Fichtel and Moll).

*Nautilus pompilioides* Fichtel and Moll, Test. Micr., 1803, p. 31, pl. 2, figs. *a–c*.
*Nonionina pompilioides* Parker, Jones, and H. B. Brady, Ann. Mag. Nat. *Hist*., ser. 3, vol. 16, 1865, p. 18, pl. 3, fig. 98; ser. 4, vol. 8, 1871, p. 246, pl. 12, fig. 158.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 727, pl. 109, figs. 10, 11.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 25. pl. 17, fig. 2.

The only station at which this species is recorded is D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

*Nonionina pompilioides—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15525 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |

## NONIONINA BOUEANA d'Orbigny.

*Nonionina boueana* d'Orbigny, Foram. Foss. Vienne, 1846, p. 108, pl. 5, figs. 11, 12.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 729, pl. 109, figs. 12, 13.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 28, pl. 16, fig. 1.

Rare specimens occur at the following stations: D5217, between Burias and Luzon, 105 fathoms (193 meters), D5201, China Sea, off

Hongkong, 554 fathoms (1,012 meters); D5570, north of Tawi Tawi, 330 fathoms (604 meters); and in shallow water in Little Harbor, south of Luneta, Manila Harbor.

The specimens are characteristic.

*Nonionina boueana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob.. | Rare. |
| [illegible] | U.S.N.M. | 1 | .......... | Manila Bay, P. I.......... | ...... | ...... | .............. | Rare. |

## Genus POLYSTOMELLA Lamarck, 1822.

### POLYSTOMELLA SUBNODOSA (Münster).

*Robulina subnodosa* Münster, Neues Jahrb. für Min., 1838, p. 391, pl. 3, fig. 61.
*Polystomella subnodosa* Reuss, Sitz. Akad. Wiss. Wien, vol. 18, 1855, p. 240, pl. 4, figs. 51*a*, *b*.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 734, pl. 110, figs. 1*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 32, pl. 14, fig. 8.

Very characteristic specimens of this species have been noted at 13 stations in the area, ranging in depth from 12 to 138 fathoms (22 to 252 meters), the average 41 fathoms (75 meters). The bottom temperatures at three stations ranged from 52.4° F. to 63.1° F. (11.3° C. to 17.2° C.); the average temperature 57.9° F. (14.5° C.).

All these specimens are in the region of the Archipelago, the most of them about the Sulu Sea, in comparatively shallow water. It does not seem to be common, however, at any of these stations, and is not nearly as common as the other two species of this genus in the same general area.

*Polystomella subnodosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15541 | U.S.N.M. | 2 | D5109... | 14 03 45 N.; 120 16 30 E... | 12 | ....... | Co........... | Rare. |
| 15542 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s.......... | Rare. |
| 15543 | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s.......... | Rare. |
| 15544 | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. sh........ | Rare. |
| 15545 | U.S.N.M. | 1 | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s.......... | Rare. |
| 15546 | U.S.N.M. | 7 | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh.... | Frequent. |
| 15547 | U.S.N.M. | 3 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s.............. | Rare. |
| 15548 | U.S.N.M. | 2 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne.s.,blk.sp. | Rare. |
| 15549 | U.S.N.M. | 10+ | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Common. |
| 15550 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Frequent. |
| 15551 | U.S.N.M. | 1 | D5220... | 13 28 00 N.; 121 58 00 E... | 50 | 52.4 | gn. m........ | Rare. |
| 15552 | U.S.N.M. | 1 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Rare. |
| 15553 | U.S.N.M. | 2 | D5546... | 6 06 48 N.; 121 28 32 E... | 138 | 58.3 | fne. co. s.... | Rare. |

### POLYSTOMELLA CRISPA (Linnaeus).

*Nautilus crispus* LINNAEUS, Syst. Nat., ed. 12, 1767, p. 1162.
*Polystomella crispa* LAMARCK, Anim. sans Vert., vol. 7, 1822, p. 625, No. 1.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 736, pl. 110, figs. 6, 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 32, pl. 18, fig. 1.

This is one of the species which is common in shallow water of the tropics, especially in the Indo-Pacific. It has been found at 36 stations in the area, ranging in depth from 10 to 554 fathoms (18 to 1,012 meters), with the average depth 122 fathoms (222 meters). Bottom temperatures are given at eight stations, ranging from 50° F. to 75.7° F. (10.2° C. to 24.2° C.), the average temperature 57.5° F. (14.2° C.). All but one of these stations are in the Philippines proper, except D5640, Buton Strait, and this is also in shallow water, the depth being 24 fathoms (44 meters).

Those stations at which it occurred in greatest abundance are all under 20 fathoms (37 meters), showing that the general habitat is in comparatively shallow water.

*Polystomella crispa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15554 | U.S.N.M. | 5 | D5136 | 6 04 20 N.; 120 59 30 E. | 22 | | s., sh. | Few. |
| 15555 | U.S.N.M. | 10+ | D5138 | 6 06 00 N.; 120 58 50 E. | 19 | | s., Co | Common. |
| 15556 | U.S.N.M. | 5 | D5139 | 6 06 00 N.; 121 02 30 E. | 20 | | co. s. | Common. |
| 15557 | U.S.N.M. | 1 | D5141 | 6 09 00 N.; 120 58 00 E. | 29 | | co. s. | Rare. |
| 15558 | U.S.N.M. | 6 | D5142 | 6 08 10 N.; 121 02 40 E. | 21 | | co. sh. | Few. |
| 15559 | U.S.N.M. | 6 | D5143 | 6 05 50 N.; 121 02 15 E. | 19 | | co. sh. | Few. |
| 15560 | U.S.N.M. | 10 | D5144 | 6 05 50 N.; 121 02 15 E. | 19 | | co. sh. | Common. |
| 15561 | U.S.N.M. | 5 | D5145 | 6 04 30 N.; 120 59 30 F. | 23 | | co. sh. | Common. |
| 15562 | U.S.N.M. | 10+ | D5148 | 5 35 40 N.; 120 47 30 E. | 17 | | co. sh. | Common. |
| 15563 | U.S.N.M. | 6 | D5151 | 5 24 40 N.; 120 27 15 E. | 24 | | co. sh. | Common. |
| 15564 | U.S.N.M. | 10+ | D5154 | 5 14 50 N.; 119 58 45 E. | 12 | | co. s. | Common. |
| 15565 | U.S.N.M. | 9 | D5156 | 5 12 50 N.; 119 55 55 E. | 18 | | fne. s., sh. | Common. |
| 15566 | U.S.N.M. | 6 | D5159 | 5 11 50 N.; 119 54 00 E. | 10 | | co. s. | Common. |
| 15567 | U.S.N.M. | 2 | D5160 | 5 12 40 N.; 119 55 10 E. | 12 | | s. | Rare. |
| 15568 | U.S.N.M. | 8 | D5161 | 5 10 15 N.; 119 53 00 E. | 16 | | fne. s. | Common. |
| 15569 | U.S.N.M. | 8 | D5172 | 6 03 15 N.; 120 35 30 E. | 318 | | fne. s., sh. | Common. |
| 15570 | U.S.N.M. | 5 | D5178 | 12 43 00 N.; 122 06 15 E. | 78 | | fne. s., sh. | Common. |
| 15571 | U.S.N.M. | 10+ | D5179 | 12 38 15 N.; 122 12 38 E. | 37 | 75.7 | hrd. s. | Common. |
| 15572 | U.S.N.M. | 4 | D5181 | 11 36 40 N.; 123 26 35 E. | 26 | | m., fne. s. | Common. |
| 15573 | U.S.N.M. | 6 | D5192 | 11 09 15 N.; 123 50 00 E. | 32 | | gn. s. | Common. |
| 15574 | U.S.N.M. | 1 | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m. | Rare. |
| 15575 | U.S.N.M. | 4 | D5250 | 7 05 07 N.; 125 39 45 E. | 23 | | co. s. | Few. |
| 15576 | U.S.N.M. | 4 | D5311 | 21 33 00 N.; 116 15 00 E. | 88 | | crs. s. | Few. |
| 15577 | U.S.N.M. | 10+ | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co. s. | Common. |
| 15578 | U.S.N.M. | 3 | D5358 | 6 05 40 N.; 118 18 15 E. | 39 | | m. | Few. |
| 15579 | U.S.N.M. | 5 | D5368 | 13 35 30 N.; 121 48 00 E. | 181 | | gy. m. | Few. |
| 15580 | U.S.N.M. | 3 | D5380 | 13 02 45 N.; 122 29 00 E. | | | | Few. |
| 15581 | U.S.N.M. | 1 | D5385 | 13 24 50 N.; 123 03 70 E. | 327 | 62.4 | gy. m. | Few. |
| 15582 | U.S.N.M. | 1 | D5430 | 9 49 40 N.; 119 08 20 E. | 464 | 50.0 | glob. ooze. | Few. |
| 15583 | U.S.N.M. | 3 | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | | gn. m. | Few. |
| 15584 | U.S.N.M. | 3 | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | | s., sh. | Few. |
| 15585 | U.S.N.M. | 1 | D5571 | 5 30 45 N.; 120 07 57 E. | 340 | 52.3 | s., sh. | Few. |
| 15586 | U.S.N.M. | 3 | D5576 | 5 25 56 N.; 120 03 39 E. | 277 | 53.3 | s. | Few. |
| 15587 | U.S.N.M. | 1 | D5640 | 4 27 00 S.; 122 55 40 E. | 24 | | s., blk. sh. | Few. |
| 13345 | U.S.N.M. | 2 | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | br. s., Co. | Few. |
| 13341 | U.S.N.M. | 1 | | Cagayan, P. I. | | | | Few. |

### POLYSTOMELLA CRATICULATA (Fichtel and Moll).

*Nautilus craticulatus* FICHTEL and MOLL, Test. Micr., 1803, p. 51, pl. 5, figs. *h–k*.
*Polystomella craticulata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 284, No. 3.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 739, pl. 110, figs. 16, 17.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 34, pl. 19, fig. 4.

This is the most common species of the genus and one of the most common of the foraminifera in the whole region. It is distinctively characteristic of tropical shallow water and reaches exceptionally fine development in this region. It occurred at 55 stations, ranging in depth from 10 to 565 fathoms (18 to 1,038 meters), the average depth 95 fathoms (174 meters). Bottom temperatures are given at but 12 stations, ranging from 47.4° F. to 75.7° F. (8.5° C. to 24.2° C.), the average temperature 57.1° F. (13.9° C.).

It is much more abundant at the stations in depths of 25 fathoms (46 meters) or less, and apparently is found in very shallow water.

*Polystomella craticulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15588 | U.S.N.M. | 1 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Rare. |
| 15589 | U.S.N.M. | 10+ | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Common. |
| 15590 | U.S.N.M. | 8 | D5109... | 14 03 45 N.; 120 16 30 E... | 10 | ....... | Co.......... | Common. |
| 15591 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk. gy. m... | Rare. |
| 15592 | U.S.N.M. | 10 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Common. |
| 15593 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N.; 15° W., 0.3 m. | 26 | ....... | gn. m., s.... | Common. |
| 15594 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N.; 52° E., 1.5 m. | 38 | ....... | gn. m., s.... | Common. |
| 15595 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Common. |
| 15596 | U.S.N.M. | 9 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh........ | Common. |
| 15597 | U.S.N.M. | 10+ | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., Co........ | Common. |
| 15598 | U.S.N.M. | 2 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| 15599 | U.S.N.M. | 4 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s......... | Rare. |
| 15600 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh.... | Common. |
| 15601 | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Common. |
| 15602 | U.S.N.M. | 10+ | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Common. |
| 15603 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Common. |
| 15604 | U.S.N.M. | 3 | D5146... | 5 46 40 N.; 120 48 50 E... | 24 | ....... | co. s., sh.... | Few. |
| 15605 | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh.... | Rare. |
| 15606 | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Common. |
| 15607 | U.S.N.M. | 9 | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ....... | co. s., sh.... | Common. |
| 15608 | U.S.N.M. | 5 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Few. |
| 15609 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh.... | Few. |
| 15610 | U.S.N.M. | 10+ | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Common. |
| 15611 | U.S.N.M. | 10+ | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh... | Common. |
| 15612 | U.S.N.M. | 10+ | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Common. |
| 15613 | U.S.N.M. | 5 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............. | Common. |
| 15614 | U.S.N.M. | 5 | D5161... | 5 10 15 N.; 119 58 00 E... | 16 | ....... | fne. s........ | Common. |
| 15615 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Common. |
| 15616 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Common. |
| 15617 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 15618 | U.S.N.M. | 2 | D5182... | 11 30 40 N.; 123 23 20 E... | 24 | ....... | fne. s., m.... | Rare. |
| 15619 | U.S.N.M. | 2 | D5184... | 10 18 30 N.; 122 23 30 E... | 565 | 49.8 | gn. m......... | Rare. |
| 15620 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| 15621 | U.S.N.M. | 4 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | fne. s., m.... | Few. |
| 15622 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Common. |
| 15623 | U.S.N.M. | 2 | D5220... | 13 38 00 N.; 121 00 58 E... | 50 | ....... | sft. gn. m... | Rare. |
| 15624 | U.S.N.M. | 5 | D5268... | 13 42 00 N.; 120 58 25 E... | 170 | ....... | p., s., sh..... | Rare. |
| 15625 | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Common. |
| 15626 | U.S.N.M. | 4 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | ....... | fne. s........ | Few. |
| 15627 | U.S.N.M. | 1 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s.... | Rare. |
| 15628 | U.S.N.M. | 3 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Rare. |
| 15629 | U.S.N.M. | 2 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m.... | Rare. |
| 15630 | U.S.N.M. | 10+ | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s......... | Common. |
| 15631 | U.S.N.M. | 2 | D5356... | 6 06 40 N.; 118 18 15 E... | 39 | ....... | m............ | Rare. |
| 15632 | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m........ | Rare. |
| 15633 | U.S.N.M. | 1 | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s.... | Rare. |
| 15634 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Rare. |
| 15635 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s..... | Rare. |
| 15636 | U.S.N.M. | 3 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| 15637 | U.S.N.M. | 2 | D5574... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s............. | Rare. |
| 15638 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Rare. |
| 15639 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 56.8 | br. s., Co.... | Rare. |
| 15640 | U.S.N.M. | 3 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Rare. |
| 15641 | U.S.N.M. | 10+ | .......... | Tacloban Anchorage, P. I. | ...... | ....... | ............ | Common. |
| 15340<br>15344 | U.S.N.M. | 10+ | .......... | Cebu.......................... | ...... | ....... | ............ | Common. |

### Genus AMPHISTEGINA d'Orbigny, 1826.

A reference to the various figures and descriptions given by Brad and by the subsequent authors will show that the genus *Amphistegina* includes numerous things. Brady refers all the forms of th genus to *Amphistegina lessonii*. Heron-Allen and Earland in thei Kerimba paper reference (p. 736) distinguish three forms and mentio a fourth. Fornasini[28] has given figures of the various forms fro the Planchés Inédites of d'Orbigny. A study of the Philippin material, which is abundant, has shown several forms which see to be distinct. A comparison of these with the originals of d'Orbign shows several interesting points. The original figures of d'Orbigny show a form nearly equally biconvex, with a blunt periphery an very numerous chambers, usually with a secondary series of clea shell tissue between the suture lines. D'Orbigny's model, howeve (No. 98), shows a more convex form with an acutely carinat periphery and much fewer chambers. This form is close to that figure by Fornasini (pl. 2, fig. 1). If from these two distinct forms whic d'Orbigny had under this name the original of the figure in the 182 work is taken as a type, the typical *A. lessonii* as considered her will be a rather flattened biconvex test with a bluntly rounde periphery, very numerous narrow oblique chambers, and with the umb very small but prominent, usually clear shell material. The suture are almost always darker than the rest of the test, and between the are usually shorter lines or points, also clear shell material, showin dark against the lighter colored background. The second form which in Fornasini's paper is figured (pl. 2, fig.), represents a variet named by d'Orbigny *madagascariensis*. This has few chambers, a acutely carinate border, very oblique sutures, and no papillae nea the umbilical area. These two forms are very distinct in the Philippine specimens. A third very large form has very numerous chambers, the sutures nearly straight, and radiating from the center t the periphery. This is the form distinguished by Chapman an Heron-Allen and Earland as variety *radiata* (Fichtel and Moll).

The genus is most common in shallow, warm water, especiall among the islands of the Archipelago.

#### AMPHISTEGINA LESSONII d'Orbigny.

*Amphistegina lessonii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 304, No. 3, p 17, figs. 1-4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, 740, pl. 111, fig. 1.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 35.

The typical form of the species, as has already been noted, is biconvex test with very numerous oblique chambers, the peripher bluntly rounded, the sutures oblique, very sharply angled near th periphery; the sutures themselves on the surface usually all clea shell material, showing darker against the nearly white opaque background formed by the lateral walls of the chamber; also between th sutures there are shorter lines of clear shell material and very ofte small dots of similar color; wall usually smooth except on the ventral side near the aperture where it is finely papillate.

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[28] Rend. Acad. Sci. Bologna, vol. 7, 1903.

[29] Ann. Sci. Nat., vol. 7, 1826, pl. 17, figs. 1-4.

*Distribution.*—This species is very common especially in warm, shallow waters. It is very frequent in waters less than 30 fathoms (55 meters) in depth, and makes up a considerable proportion of the sand on some of the beaches. It is most abundant in the region of the Sulu Archipelago, and is usually associated with *Heterostegina*, *Operculina*, *Alveolina*, *Orbitolites*, and other genera characteristic of this same type of habitat. The deeper records, of which there are comparatively few, are usually represented by very few specimens. It has occurred in the following localities: China Sea, off southern Luzon; Sulu Archipelago; near Basilan Island: off Jolo Jolo; off Siasi; off Tawi Tawi; off Romblon; off eastern Panay; off northern Cebu; Sogod Bay, southern Leyte; between Burias and Luzon; Gulf of Davao; Verde Island Passage; China Sea, off Hongkong; Palawan Passage; Ragay Gulf, Luzon; between Cebu and Bohol; east coast Luzon; between Samar and Leyte; between Negros and Siquijor; Darvel Bay, Borneo; Buton Strait; and Macassar Strait.

*Amphistegina lessonii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15425 | U.S.N.M. | 10+ | D5108 | 14 23 55 N.; 120 32 33 E. | 37 | | gy. m. | Common. |
| 15426 | U.S.N.M. | 3 | D5109 | 14 03 45 N.; 120 16 30 E. | 10 | | Co. | Few. |
| 15427 | U.S.N.M. | 10+ | D5110 | 13 59 20 N.; 120 75 45 E. | 135 | 59.0 | dk. gy. m. | Common. |
| 15428 | U.S.N.M. | 10+ | D5134 | 6 44 45 N.; 121 48 00 E. | 25 | | fne. s. | Common. |
| 15429 | U.S.N.M. | 10+ | D5138 | 6 06 00 N.; 120 58 50 E. | 19 | | s., Co. | Common. |
| 15430 | U.S.N.M. | 10+ | D5139 | 6 06 00 N.; 121 02 30 E. | 20 | | crs., s. | Common. |
| 15431 | U.S.N.M. | 10+ | D5142 | 6 06 10 N.; 121 02 40 E. | 21 | | cro. s., sh. | Common. |
| 15432 | U.S.N.M. | 10+ | D5144 | 6 05 50 N.; 121 02 15 E. | 19 | | crs. s., sh. | Common. |
| 15433 | U.S.N.M. | 7 | D5145 | 6 04 30 N.; 120 59 30 E. | 23 | | crs. s., sh. | Common. |
| 15434 | U.S.N.M. | 10+ | D5146 | 5 46 40 N.; 120 48 50 E. | 24 | | crs. s., sh. | Common. |
| 15435 | U.S.N.M. | 10+ | D5148 | 5 35 40 N.; 120 47 30 E. | 17 | | crs. s., sh. | Common. |
| 15436 | U.S.N.M. | 10+ | D5152 | 6 22 55 N.; 120 15 45 E. | 34 | | wh. s. | Common. |
| 15437 | U.S.N.M. | 7 | D5153 | 5 18 10 N.; 120 02 55 E. | 49 | | crs. s., sh. | Common. |
| 15438 | U.S.N.M. | 3 | D5156 | 5 12 50 N.; 119 55 55 E. | 18 | | fne. s., sh. | Few. |
| 15439 | U.S.N.M. | 10+ | D5159 | 5 11 50 N.; 119 54 00 E. | 10 | | crs. s. | Common. |
| 15440 | U.S.N.M. | 5 | D5161 | 5 10 15 N.; 119 53 00 E. | 16 | | fne. s. | Common. |
| 15441 | U.S.N.M. | 10 | D5172 | 6 03 15 N.; 120 35 30 E. | 318 | | fne. s., sh. | Common. |
| 15442 | U.S.N.M. | 10 | D5178 | 12 43 00 N.; 122 06 15 E. | 78 | | fne. s. | Common. |
| 15443 | U.S.N.M. | 10+ | D5179 | 12 38 15 N.; 122 12 30 E. | 37 | 75.7 | hrd. s. | Common. |
| 15444 | U.S.N.M. | 10+ | D5181 | 11 36 40 N.; 123 26 35 E. | 26 | | m., fne. s. | Common. |
| 15445 | U.S.N.M. | 2 | D5182 | 11 34 40 N.; 123 23 20 E. | 24 | | fne. s., m. | Few. |
| 15446 | U.S.N.M. | 10+ | D5192 | 11 09 15 N.; 123 50 00 E. | 32 | | gn. s. | Common. |
| 15447 | U.S.N.M. | 6 | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. m., s. | Common. |
| 15448 | U.S.N.M. | 6 | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s. | Common. |
| 15449 | U.S.N.M. | 1 | D5219 | 13 21 00 N.; 122 18 45 E. | 530 | 50.8 | gn. m. | Rare. |
| 15450 | U.S.N.M. | 10+ | D5250 | 7 05 07 N.; 125 39 45 E. | 23 | | co. s. | Common. |
| 15451 | U.S.N.M. | 5 | D5268 | 13 42 00 N.; 120 57 15 E. | 170 | | s., p. | Common. |
| 15452 | U.S.N.M. | 6 | D5276 | 13 49 15 N.; 120 14 45 E. | 18 | | sh., p., s. | Common. |
| 15453 | U.S.N.M. | 10+ | D5282 | 13 53 00 N.; 120 26 45 E. | 248 | 47.4 | dk. gy. s. | Common. |
| 15455 | U.S.N.M. | 2 | D5296 | 13 40 09 N.; 120 57 45 E. | 210 | | m., s. | Few. |
| 15456 | U.S.N.M. | 1 | D5311 | 21 33 00 N.; 116 15 00 E. | 88 | | crs. s., sh. | Few. |
| 15457 | U.S.N.M. | 1 | D5349 | 10 54 00 N.; 118 26 20 E. | 730 | 40.6 | co. s. | Few. |
| 15458 | U.S.N.M. | 2 | D5381 | 13 14 15 N.; 122 44 45 E. | 88 | | co. s. | Few. |
| 15459 | U.S.N.M. | 1 | D5412 | 10 09 15 N.; 123 52 00 E. | 162 | 54.8 | gn. m. | Few. |
| 15460 | U.S.N.M. | 1 | D5465 | 13 39 42 N.; 123 40 39 E. | 500 | | gy. m. | Few. |
| 15461 | U.S.N.M. | 3 | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | | gn. m. | Few. |
| 15462 | U.S.N.M. | 4 | D5481 | 10 27 30 N.; 125 17 10 E. | 61 | | s., sh., g. | Few. |
| 15463 | U.S.N.M. | 7 | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.3 | gn. m., s. | Common. |
| 15464 | U.S.N.M. | 1 | D5569 | 5 33 15 N.; 120 15 30 E. | 303 | 52.3 | co. s. | Rare. |
| 15465 | U.S.N.M. | 2 | D5570 | 5 32 15 N.; 120 12 57 E. | 330 | 52.3 | fne. s., glob. | Few. |
| 15466 | U.S.N.M. | 3 | D5571 | 5 30 45 N.; 120 07 57 E. | 340 | 52.3 | s., sh. | Few. |
| 15467 | U.S.N.M. | 3 | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | br. s., Co. | Few. |
| 15468 | U.S.N.M. | 3 | D5640 | 4 27 00 S.; 122 55 40 E. | 24 | | s., brk. sh. | Few. |
| 15454 | U.S.N.M. | 1 | D5668 | 2 28 15 S.; 118 49 00 E. | 901 | 38.2 | gy. m. | Few. |

### AMPHISTEGINA LESSONII d'Orbigny, var. MADAGASCARIENSIS d'Orbigny.

*Amphistegina madagascariensis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 305, No. 5.—FORNASINI, Rend. Acad. Sci. Bologna, vol. 7, 1903, p. 144, pl. 2, fig. 5.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 736.

This form, which is here referred to d'Orbigny's *Amphistegina madagascariensis*, seems to be very distinct in the Philippine material and may be a valid species. It differs from the typical *A. lessonii* in the smaller number of chambers and the acutely carinate periphery, the unequal biconvex form, and the larger umbonal clear space. The sutures are more evenly curved and are usually depressed. In the Philippine material there seem to be no intermediate forms between these two. This variety is found under similar conditions as the typical, most abundant in warm shallow waters, and occurs with the typical, although in less numbers.

*Amphistegina lessonii*, var. *madagascariensis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15469 | U.S.N.M. | 1 | D5106... | 14 23 55 N.; 120 32 33 E.... | 37 | ....... | gy. m...... | Rare. |
| 15470 | U.S.N.M. | 2 | D5109... | 14 03 45 N.; 120 16 30 E.... | 10 | ....... | Co.......... | Rare. |
| 15471 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.... | 135 | 59.0 | dk. gy. m... | Rare. |
| 15472 | U.S.N.M. | 5 | D5113... | 13 51 30 N.; 120 50 30 E.... | 159 | ....... | dk. gr. m.... | Few. |
| 15473 | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E.... | 25 | ....... | fne. s........ | Few. |
| 15474 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E.... | 20 | ....... | crs. s........ | Rare. |
| 15475 | U.S.N.M. | 7 | D5146... | 5 46 40 N.; 120 48 50 E.... | 24 | ....... | crs. s., sh.... | Few. |
| 15476 | U.S.N.M. | 7 | D5148... | 5 35 40 N.; 120 47 30 E.... | 17 | ....... | crs. s., sh.... | Few. |
| 15477 | U.S.N.M. | 7 | D5154... | 5 14 50 N.; 119 58 45 E.... | 12 | ....... | co. s......... | Few. |
| 15478 | U.S.N.M. | 8 | D5159... | 5 11 50 N.; 119 54 00 E.... | 10 | ....... | crs. s........ | Common. |
| 15479 | U.S.N.M. | 10+ | D5160... | 5 12 40 N.; 119 55 10 E.... | 12 | ....... | s............. | Common. |
| 15480 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E.... | 37 | 75.7 | hrd. sh...... | Common. |
| 15481 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E.... | 20 | ....... | crs. s........ | Rare. |
| 15482 | U.S.N.M. | 4 | D5250... | 7 05 07 N.; 125 39 45 E.... | 23 | ....... | co. s......... | Rare. |
| 15483 | U.S.N.M. | 4 | D5276... | 13 49 15 N.; 120 14 45 E.... | 18 | ....... | sh., p., s.... | Rare. |
| 15484 | U.S.N.M. | 4 | D5430... | 9 49 40 N.; 119 03 20 E.... | 464 | 50.0 | glob. ooze... | Rare. |
| 15485 | U.S.N.M. | 1 | D5465... | 13 39 42 N. 123 40 39 E.... | 500 | ....... | gy. m........ | Rare. |
| 15486 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.... | 500 | ....... | gr. m......... | Rare. |
| 15487 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.... | ....... | ....... | ............ | Rare. |
| 15488 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E.... | 256 | 53.3 | gn. m., s.... | Rare. |
| 15489 | U.S.N.M. | 2 | D5572... | 5 31 26 N.; 120 09 45 E.... | 334 | 52.3 | s............. | Rare. |
| 15490 | U.S.N.M. | 10+ | D5640... | 4 27 00 S.; 122 55 40 E.... | 24 | ....... | s., brk. sh... | Common. |

### AMPHISTEGINA LESSONII d'Orbigny, var. RADIATA (Fichtel and Moll).

*Nautilus radiatus* FICHTEL and MOLL, Test. Micr., 1798, p. 58, pl. 8, figs. 8, *a–d*.

*Amphistegina radiata* CHAPMAN, Proc. Zool. Soc. London, 1895, pp. 45–47, pl. 1, figs. 8–10, 12.

*Amphistegina lessonii*, var. *radiata* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 736.

This large, many-chambered, biconvex form, which is distinguished by Chapman and also by Heron-Allen and Earland, is common at some of the stations. It is characterized by the straight, radiating suture lines which appear as transparent lines in the material of the test.

It has occurred at the following localities: China Sea, off southern Luzon; off Jolo Jolo; off Tawi Tawi; off Romblon; off eastern Panay; between Burias and Luzon; Gulf of Davao; Verde Island Passage; and Darvel Bay, Borneo.

*Amphistegina lessonii*, var. *radiata*.—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15404 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.... | 135 | 59.0 | dk. gy. m... | Rare. |
| 15405 | U.S.N.M. | 10+ | D5141... | 6 09 00 N.; 120 55 00 E.... | 29 | ....... | co. s......... | Common. |
| 15406 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E.... | 21 | ....... | crs. s., sh.... | Common. |
| 15407 | U.S.N.M. | 6 | D5144... | 6 05 50 N.; 121 02 15 E.... | 19 | ....... | crs. s......... | Few. |
| 15408 | U.S.N.M. | 9 | D5145... | 6 04 30 N.; 120 59 30 E.... | 23 | ....... | crs. s., sh.... | Common. |
| 15409 | U.S.N.M. | 5 | D5147... | 5 41 40 N.; 120 47 10 E.... | 21 | ....... | co. s., sh.... | Common. |
| 15410 | U.S.N.M. | 10+ | D5149... | 5 53 00 N.; 120 42 10 E.... | 10 | ....... | co. sh........ | Common. |
| 15411 | U.S.N.M. | 10+ | D5151... | 5 25 40 N.; 120 27 15 E.... | 24 | ....... | crs. s., sh... | Common. |
| 15412 | U.S.N.M. | 10 | D5154... | 5 14 50 N.; 119 58 45 E.... | 12 | ....... | crs. s., sh... | Common. |
| 15413 | U.S.N.M. | 9 | D5172... | 6 03 15 N.; 120 35 30 E.... | 318 | ....... | fne. s., sh... | Common. |
| 15414 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.... | 37 | 75.7 | hrd. s........ | Rare. |
| 15415 | U.S.N.M. | 5 | D5181... | 11 36 40 N.; 123 36 25 E.... | 26 | ....... | m., fne. s.... | Few. |
| 15416 | U.S.N.M. | 9 | D5184... | 10 18 30 N.; 122 23 30 E.... | 565 | 49.8 | gn. m......... | Common. |
| 15417 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E.... | 20 | ....... | crs. s......... | Common. |
| 15418 | U.S.N.M. | 7 | D5250... | 7 05 07 N.; 125 39 45 E.... | 23 | ....... | co. s.......... | Common. |
| 15419 | U.S.N.M. | 10+ | D5255... | 7 03 00 N.; 125 39 00 E.... | 108 | ....... | sft. m........ | Common. |
| 15420 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E.... | 170 | ....... | s., p.......... | Common. |
| 15421 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E.... | 18 | ....... | s., p., sh..... | Rare. |
| 15422 | U.S.N.M. | 2 | D5569... | 5 33 15 N.; 120 15 30 E.... | 303 | 52.3 | crs. s......... | Rare. |
| 15423 | U.S.N.M. | 3 | D5579... | 4 54 15 N.; 119 09 52 E.... | 175 | 55.3 | fne. s., Co.... | Few. |
| 15424 | U.S.N.M. | 4 | D5580... | 4 52 45 N.; 119 06 45 E.... | 162 | 55.8 | br. s., Co..... | Few. |

### Genus OPERCULINA d'Orbigny, 1826.

*Nautilus* (part) GRONOVIUS, Zooph. Gron., 1781, p. 282.

*Lenticulites* (part) DEFRANCE, Dict. Sci. Nat., vol. 25, 1822, p. 453.

*Operculina* D'ORBIGNY (Type, *O. complanata* Defrance), Ann. Sci. Nat., vol. 7, 1826, p. 281.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 742.—CARPENTER, Introd. Foram., 1862, p. 247.

Carpenter has given a very detailed account of the structure of this genus, and mentions especially its relations to *Heterostegina*, the relations which are very clear in a series of Philippine specimens studied. Among his material Carpenter had specimens from the Philippine region, and his notes on these, after studying the *Albatross* Philippine collection, are very interesting. There is, undoubtedly, much variation, as Carpenter mentions, but this seems to be along definite lines, and from a study of the several thousand specimens of available Philippine material the various forms seem to fall into definite categories.

In looking up the literature the first species to be described is *O. complanata* Defrance. This species, which is known from d'Orbigny's figure,[30] and from the Modèles, No. 80, is a definite many-chambered, very flat, unornamented test, the coils rapidly increasing in size, and the chambers very narrow and much curved. The type specimen is a fossil from the region of Bordeaux.

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[30] Ann. Sci. Nat., vol. 7, 1826, pl. 14, figs. 7-10.

Although many writers have referred many things to this species, a study of the Philippine collection does not show anything which may be reasonably referred to this species as shown by d'Orbigny. Therefore, as far as the Philippine species are concerned, the name is not available. A study of the other species described since d'Orbigny's time shows several names, none of which can well be applied here. As a rule the various forms of *Operculina* have been divided by various authors into smooth forms, which are referred to *Operculina complanata*, and into those showing granular ornamentation, which are usually assigned to *Operculina granulosa* Leymerie, either as a species or variety of *O. complanata*. Such a treatment is a very simple way to dispose of the entire matter. However, the study of the thousands of Philippine specimens has shown that there is no such general and simple rule which can apply to all the specimens obtained. Also a study of the type figure and description of *O. granulosa* by Leymerie, which was a fossil from Europe, shows that it is a very close-coiled form, apparently with rows of beads on the sutures. Such a form is possibly known from a few stations in the Philippines, and for this the name *O. granulosa* is restricted. Of the other forms two may take their names from the species named by d'Orbigny, and later figured in Fornasini's publication of the "planchès inédites."[31] The first of these to which d'Orbigny gave the name *O. gaimardi*, was from "Rawack, Nouvelle-Hollande." That would be in a closely related area to the Philippine faunal region, and a form very close to this occurs abundantly at a number of stations with definite geographical limitations. Another group is similar to that figured by d'Orbigny and named by him *Assilina discoidalis*. This has a large protuberant center, with numerous granules, followed by raised sutures, the whole with a definite keel and the revolving whorls thickest near the middle. Such forms are very abundant at a few stations in the Sulu Archipelago, but are very rare elsewhere. The type station for this species is Rawack.

Carpenter also mentions and figures a form from the Philippines very similar to this. For such forms the name *O. discoidalis* can be used.

In studying the large collection of *Operculina* each station was taken separately, and in this way it was possible to recognize a number of minor forms or races which seem to have a definite geographical distribution. The genus is best developed in comparatively shallow water but some of the large forms reach considerable depths.

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[31] Boll. Soc. Geol. Ital., vol. 22, 1903, pl. 14, figs. 4, 8.

It has occurred at the following localities: China Sea, off southern Luzon; off Jolo Jolo; off Tawi Tawi; off Romblon; off eastern Panay; between Burias and Luzon; Gulf of Davao; Verde Island Passage; and Darvel Bay, Borneo.

*Amphistegina lessonii*, var. *radiata*.—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15404 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E.... | 135 | 59.0 | dk. gy. m... | Rare. |
| 15405 | U.S.N.M. | 10+ | D5141... | 5 09 00 N.; 120 58 00 E.... | 29 | ....... | co. s......... | Common. |
| 15406 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E.... | 21 | ....... | crs. s., sh.... | Common. |
| 15407 | U.S.N.M. | 6 | D5144... | 6 05 50 N.; 121 02 15 E.... | 19 | ....... | crs. s......... | Few. |
| 15408 | U.S.N.M. | 9 | D5145... | 6 04 30 N.; 120 59 30 E.... | 23 | ....... | crs. s., sh.... | Common. |
| 15409 | U.S.N.M. | 5 | D5147... | 5 41 40 N.; 120 47 10 E.... | 21 | ....... | co. s., sh.... | Common. |
| 15410 | U.S.N.M. | 10+ | D5149... | 5 33 00 N.; 120 42 10 E.... | 10 | ....... | co. sh........ | Common. |
| 15411 | U.S.N.M. | 10+ | D5151... | 5 25 40 N.; 120 27 15 E.... | 24 | ....... | crs. s., sh... | Common. |
| 15412 | U.S.N.M. | 10 | D5154... | 5 14 50 N.; 119 58 45 E.... | 12 | ....... | crs. s., sh... | Common. |
| 15413 | U.S.N.M. | 9 | D5172... | 6 06 15 N.; 120 35 30 E.... | 318 | ....... | fne. s., sh... | Common. |
| 15414 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.... | 37 | 75.7 | hrd. s........ | Rare. |
| 15415 | U.S.N.M. | 5 | D5181... | 11 36 40 N.; 123 36 25 E.... | 26 | ....... | m., fne. s.... | Few. |
| 15416 | U.S.N.M. | 9 | D5184... | 10 18 30 N.; 122 23 30 E.... | 565 | 49.8 | gn. m......... | Common. |
| 15417 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E.... | 20 | ....... | crs. s......... | Common. |
| 15418 | U.S.N.M. | 7 | D5250... | 7 05 07 N.; 125 39 45 E.... | 23 | ....... | co. s......... | Common. |
| 15419 | U.S.N.M. | 10+ | D5255... | 7 03 00 N.; 125 39 00 E.... | 100 | ....... | sft. m........ | Common. |
| 15420 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E.... | 170 | ....... | s., p.......... | Common. |
| 15421 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E.... | 18 | ....... | s., p., sh..... | Rare. |
| 15422 | U.S.N.M. | 2 | D5569... | 5 33 15 N.; 120 15 30 E.... | 303 | 52.3 | crs. s......... | Rare. |
| 15423 | U.S.N.M. | 3 | D5579... | 4 54 15 N.; 119 09 52 E.... | 175 | 55.3 | fne. s., Co.... | Few. |
| 15424 | U.S.N.M. | 4 | D5580... | 4 52 45 N.; 119 06 45 E.... | 162 | 55.8 | br. s., Co..... | Few. |

## Genus OPERCULINA d'Orbigny, 1826.

*Nautilus* (part) Gronovius, Zooph. Gron., 1781, p. 282.
*Lenticulites* (part) Defrance, Dict. Sci. Nat., vol. 25, 1822, p. 453.
*Operculina* d'Orbigny (Type, *O. complanata* Defrance), Ann. Sci. Nat., vol. 7, 1826, p. 281.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 742.—Carpenter, Introd. Foram., 1862, p. 247.

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In looking up the literature the first species to be described is *O. complanata* Defrance. This species, which is known from d'Orbigny's figure,[30] and from the Modèles, No. 80, is a definite many-chambered, very flat, unornamented test, the coils rapidly increasing

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[30] Ann. Sci. Nat., vol. 7, 1826, pl. 14, figs. 7-10.

### OPERCULINA BARTSCHI, new species.

*Description.*—Test comparatively large, compressed except in the central region, coils rapidly widening; central portion thickened, biconvex, composed of several coiled chambers, and ornamented on the surface with numerous comparatively large bosses; chambers numerous, 20 to 25 in the last-formed coil; curved sutures distinct, not ornamented, but the chambers between with numerous comparatively large granulations, usually in somewhat definite lines across the test.

Diameter up to 8 mm.

*Distribution.*—Type specimen (Cat. No. 15848, U.S.N.M.) from *Albatross* station D5134 Sulu Archipelago, near Basilan Island, 25 fathoms (46 meters).

This has occurred at several stations in the area, as follows: China Sea, off southern Luzon; Sulu Sea, off western Mindanao; vicinity of Jolo; vicinity of Siasi; Tawi Tawi Group off Romblon; between Panay and Negros; of northern Cebu; Sogod Bay, southern Leyte Pacific Ocean, east coast of Mindanao; Gulf of Davao; Linapacan Strait; Palawan Passage; between Cebu and Boho; eastern Palawan and vicinity; east coast of Luzon between Leyte and Mindanao; northern Mindanao and vicinity; between Negros and Siquijor; north of Tawi Tawi; and Buton Strait.

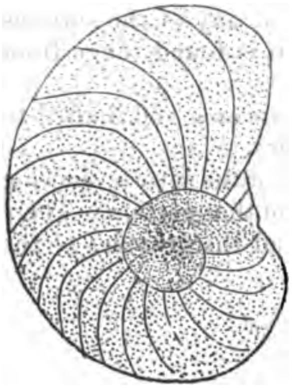

FIG. 13.—OPERCULINA BARTSCHI, NEW SPECIES. SIDE VIEW, × 15. FROM STATION D5134.

This is evidently one of the varieties described by Carpenter from the Philippines. It seems to be one of the most common species of the *Albatross* collection from the Philippine area, and has two definite varieties, which are here indicated. It is closely related to the granular forms of *Heterostegina* which were found in this material.

It is named in honor of Dr. Paul Bartsch, of the United States National Museum, whose careful collecting while in charge of the Philippine Expedition has been responsible for such abundant series of specimens.

There is a local race of this species found at two stations, D5640 and D5642, both from Buton Strait. These have a thickened periphery and larger size than the typical form. The granules of the exterior are smaller than the area farther north.

*Operculina bartschi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15845 | U.S.N.M. | 6 | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s.... | Few. |
| 15846 | U.S.N.M. | 5 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s.... | Few. |
| 15847 | U.S.N.M. | 1 | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Rare. |
| 15848 | U.S.N.M. | 5 | D5134... | 6 44 45 N.; 121 48′ 00″E.. | 25 | ....... | fne. s......... | Few. |
| 15849 | U.S.N.M. | 10+ | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s.......... | Frequent. |
| 15850 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh.... | Frequent. |
| 15851 | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Frequent. |
| 15852 | U.S.N.M. | 10 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Frequent. |
| 15853 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh.... | Frequent. |
| 15854 | U.S.N.M. | 2 | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh.... | Few. |
| 15855 | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E.. | 21 | ....... | co. s., sh.... | Rare. |
| 15856 | U.S.N.M. | 4 | D5164... | 5 01 40 N.; 119 52 50 E.. | 18 | ....... | gn. m....... | Rare. |
| 15857 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Rare. |
| 15858 | U.S.N.M. | 4 | D5184... | 10 18 30 N.; 122 23 30 E.. | 565 | 49.8 | gn. m....... | Few. |
| 15859 | U.S.N.M. | 4 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Few. |
| 15860 | U.S.N.M. | 4 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | fne. gy. s.... | Few. |
| 15861 | U.S.N.M. | 4 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 15862 | U.S.N.M. | 1 | D5250... | 7 05 07 N.; 125 39 45 E.. | 23 | ....... | co., s........ | Few. |
| 15863 | U.S.N.M. | 4 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s.... | Few. |
| 15864 | U.S.N.M. | 2 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Few. |
| 15865 | U.S.N.M. | 10+ | D5336... | 11 37 45 N.; 119 46 00 E.. | 46 | ....... | s., m........ | Frequent. |
| 15866 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co., s., m ... | Frequent. |
| 15867 | U.S.N.M. | 10 | D5339... | 11 22 00 N.; 119 12 00 E.. | 52 | ....... | m............. | Frequent. |
| 15868 | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 40.6 | Co., s ....... | Rare. |
| 15869 | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E.. | 175 | 54.5 | gn. m....... | Rare. |
| 15870 | U.S.N.M. | 4 | D5426... | 9 12 00 N.; 118 28 00 E.. | 27 | ....... | fne. gy. s.... | Few. |
| 15871 | U.S.N.M. | 7 | D5428... | 9 13 00 N.; 118 51 15 E.. | 1,105 | 49.7 | gy. m....... | Few. |
| 15872 | U.S.N.M. | 2 | D5429... | 9 41 30 N.; 118 50 22 E.. | 760 | ....... | gn. m....... | Few. |
| 15873 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m....... | Rare. |
| 15874 | U.S.N.M. | 2 | D5487... | 10 02 45 N.; 126 05 33 E.. | 782 | 52.3 | gn. m....... | Rare. |
| 15875 | U.S.N.M. | 2 | D5493... | 9 04 00 N.; 125 20 00 E.. | 478 | 52.1 | gn. m....... | Rare. |
| 15876 | U.S.N.M. | 2 | D5495... | 9 06 30 N.; 125 08 20 E.. | 976 | 52.3 | gy. m....... | Rare. |
| 15877 | U.S.N.M. | 3 | D5512... | 8 16 02 N.; 123 58 20 E.. | 445 | 52.8 | gy. m....... | Rare. |
| 15878 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............ | Rare. |
| 15879 | U.S.N.M. | 7 | D5538... | 9 08 15 N.; 123 23 20 E.. | 254 | 53.5 | gn. m....... | Few. |
| 15880 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 390 | 52.3 | fne. s., glob.. | Rare. |
| 15881 | U.S.N.M. | 10+ | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh... | Frequent. |
| 15882 | U.S.N.M. | 2 | D5642... | 4 31 40 S.; 122 49 42 E.. | 37 | ....... | gy. m....... | Rare. |

OPERCULINA BARTSCHI, new species, var. PLANA, new variety.

*Description.*—Test different from the typical form of the species in the ornamentation of the surface, which, after the early development, is usually smooth, very thin, and translucent.

This has occurred at the following stations: China Sea, off southern Luzon; vicinity of Jolo; off northern Cebu; Sogod Bay, southern Leyte; between Marinduque and Luzon; Pacific Ocean, east coast of Mindanao; southern Mindanao; China Sea, off Formosa; Palawan Passage; between Samar and Leyte; between Leyte and Mindanao; northern Mindanao and vicinity; and between Negros and Siquijor.

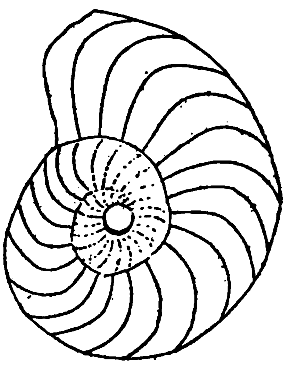

FIG. 14.—OPERCULINA BARTSCHI, VAR. PLANA, NEW VARIETY. × 30. SIDE VIEW. FROM STATION D5105.

This usually occurs with the typical form of the species, but is not as common. There is a peculiar race which was noted only at D5257, southern Mindanao, in 28 fathoms (51 meters).

*Operculina bartschi*, var. *plana*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15883 | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s.... | Frequent. |
| 15884 | U.S.N.M. | 2 | D5105... | 14 43 55 N.; 120 12 50 E.. | 25 | ....... | ............... | Few. |
| 15885 | U.S.N.M. | 1 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m........ | Rare. |
| 15886 | U.S.N.M. | 4 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh.... | Few. |
| 15887 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Frequent. |
| 15888 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Few. |
| 15889 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Rare. |
| 15890 | U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 15891 | U.S.N.M. | 10+ | D5257... | 7 22 12 N.; 124 12 15 E.. | 28 | ....... | m............ | Frequent. |
| 15892 | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | ....... | s., sh........ | Rare. |
| 15893 | U.S.N.M. | 5 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co., s., m ... | Few. |
| 15894 | U.S.N.M. | 4 | D5339... | 11 22 00 N.; 119 12 00 E.. | 52 | ....... | m............ | Few. |
| 15895 | U.S.N.M. | 9 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh........... | Common. |
| 15896 | U.S.N.M. | 1 | D5487... | 10 02 45 N.; 125 05 33 E.. | 732 | 32.3 | gn. m........ | Rare. |
| 15897 | U.S.N.M. | 7 | D5493... | 9 04 00 N.; 125 20 00 E.. | 478 | 52.1 | gn. m........ | Frequent. |
| 15898 | U.S.N.M. | 3 | D5495... | 9 06 30 N.; 125 00 20 E.. | 976 | 52.3 | gy. m........ | Few. |
| 15899 | U.S.N.M. | 6 | D5512... | 8 16 02 N.; 123 58 26 E.. | 445 | 52.8 | gy. m........ | Few. |
| 15900 | U.S.N.M. | 2 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m........ | Few. |
| 15901 | U.S.N.M. | 4 | D5538... | 9 08 15 N.; 123 23 20 E.. | 254 | 53.5 | gn. m........ | Few. |

### OPERCULINA BARTSCHI, new species, var. ORNATA, new variety.

Plate 74, figs. 2*a*, *b*.

*Description.*—Variety differing from the typical in the ornamentation, especially in the later portion of the test, where the granules, instead of being confined to the surface of the chambers themselves, appear only above the sutures.

This variety occurs with the typical and with the preceding variety, and at D5257, southern Mindanao, is a peculiar local race; another occurs at D5640, Buton Strait.

*Operculina bartschi*, var. *ornata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15902 | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s.... | Frequent. |
| 15903 | U.S.N.M. | 5 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Few. |
| 15904 | U.S.N.M. | 1 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Rare. |
| 15905 | U.S.N.M. | 1 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Rare. |
| 15906 | U.S.N.M. | 4 | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh..... | Few. |
| 15907 | U.S.N.M. | 7 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s., sh .... | Few. |
| 15908 | U.S.N.M. | 3 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s., sh..... | Few. |
| 15909 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh..... | Common. |
| 15910 | U.S.N.M. | 9 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Common. |
| 15911 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 15912 | U.S.N.M. | 1 | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m........... | Rare. |
| 15913 | U.S.N.M. | 10+ | D5257... | 7 22 12 N.; 124 12 15 E... | 28 | ....... | m........... | Frequent. |
| 15914 | U.S.N.M. | 2 | D5338... | 11 33 45 N.; 119 24 45 E... | 143 | ....... | co. s., m..... | Rare. |
| 15915 | U.S.N.M. | 4 | D5339... | 11 22 00 N.; 119 12 00 E... | 52 | ....... | m........... | Few. |
| 15916 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 254 | 53.5 | gn. m....... | Few. |
| 15917 | U.S.N.M. | 6 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Few. |

### OPERCULINA PHILIPPINENSIS, new species.

*Description.*—Test compressed, not flaring, close-coiled, complanate; central area thickened by the proloculum only; thin throughout, opaque; chambers 15 to 20 in the last-formed coil; surface of the chambers smooth; sutures ornamented by a row of raised tubercles, the sutures typical, nearly straight, then near the periphery bend back sharply to the outer edge.

Diameter 3–5 mm.

*Distribution.*—Type specimen (Cat. No. 15923, U.S.N.M.) from *Albatross* station D5134, Sulu Archipelago, near Basilan Island, 25 fathoms (46 meters).

This is a common species in the Philippine area, and while some of its specimens show relations with other species it is usually distinct. At *Albatross* station D5428 there is a local race, differing from the typical in the larger size, and in the very prominent keel which in the adult is thicker than that part of the test which is adjacent to it; the rows of beads in the adult specimens usually become fused.

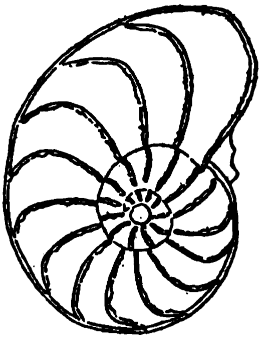

Fig. 15.—Operculina philippinensis, new species. Side view. ×15. From station D5134.

*Operculina philippinensis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15918 | U.S.N.M. | 6 | D5097... | 14 19 15 N.; 120 33 52 E... | 28 | ....... | gy. m., s.... | Few. |
| 15919 | U.S.N.M. | 6 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m. ...... | Few. |
| 15920 | U.S.N.M. | 2 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Few. |
| 15921 | U.S.N.M. | 10 | D5132... | Island off Panabutan Point, N.; 15° W., 0.3 mile. | 26 | ....... | gn. m., s.... | Frequent. |
| 15922 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point N.; 52° E., 1.50 miles. | 38 | ....... | gn. m., s.... | Frequent. |
| 15923 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Frequent. |
| 15924 | U.S.N.M. | 2 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh..... | Few. |
| 15925 | U.S.N.M. | 10+ | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m ....... | Frequent. |
| 15926 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Frequent. |
| 15927 | U.S.N.M. | 6 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Frequent. |
| 15928 | U.S.N.M. | 10+ | D5184... | 10 18 30 N.; 122 23 30 E... | 565 | 49.8 | gn. m ....... | Frequent. |
| 15929 | U.S.N.M. | 3 | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn. m ....... | Few. |
| 15930 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Frequent. |
| 15931 | U.S.N.M. | 10+ | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | fne. gy. s.... | Frequent. |
| 15932 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 15933 | U.S.N.M. | 2 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m., co. s..... | Rare. |
| 15934 | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Frequent. |
| 15935 | U.S.N.M. | 5 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Few. |
| 15936 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |
| 15937 | U.S.N.M. | 1 | D5313... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............ | Rare. |
| 15938 | U.S.N.M. | 10+ | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s........ | Frequent. |
| 15939 | U.S.N.M. | 10+ | D5358... | 6 06 40 N.; 118 18 15 E... | ....... | ....... | co. s........ | Frequent. |
| 15940 | U.S.N.M. | 7 | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s.... | Frequent. |
| 15941 | U.S.N.M. | 4 | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m ....... | Few. |
| 15942 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | ............. | Rare. |

## OPERCULINA DISCOIDALIS (d'Orbigny).

*Assilina discoidalis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 296, No. 1; Modèles, 1826, No. 88.—FORNASINI, Boll. Soc. Geol. Ital., vol. 22, 1903, pl. 14, fig. 8.

*Description.*—Test close-coiled throughout; central portion with a definite large proloculum, and the region next to it with numerous large bosses; three or four coils, with numerous chambers, the center part of each coil being thicker than the edges, leaving a deep-channelled spiral where the coils come together; the periphery with a definite smooth edge, keeled, and finely striate; spiral lines of th early portion ornamented by rows of beadlike protuberances which in later growth may become confluent.

It has occurred at 10 stations in the Philippine area, as follows Sulu Sea, off western Mindanao; Sulu Archipelago, near Basila Island; vicinity of Jolo, Sulu Archipelago; Tawi Tawi Group; o northern Cebu; off eastern Mindoro; and Jolo Sea.

This species was described by d'Orbigny from "la mer du Sud Rawack." It is very abundant at three adjacent stations—D513 D5133, D5134, Sulu Sea, off western Mindanao. It is evidentl one of the species that Carpenter had from the Philippines, and ca be recognized in his description. There is considerable variatio in the thickness of the test and the following variety may be distinguished.

*Operculina discoidalis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15963 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N.; 15 W., 0.3 mile. | 26 | ....... | gn. m., s..... | Frequent. |
| 15964 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N.; 52 E., 1.5 miles. | 38 | ....... | gn. m., s..... | Frequent. |
| 15965 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s......... | Frequent. |
| 15966 | U.S.N.M. | 8 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh......... | Frequent. |
| 15967 | U.S.N.M. | 1 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh..... | Rare. |
| 15968 | U.S.N.M. | 4 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh..... | Few. |
| 15969 | U.S.N.M. | 5 | D5156... | 5 12 50 N.; 119 55 55 E.. | 18 | ....... | fne. s......... | Few. |
| 15970 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Few. |
| 15971 | U.S.N.M. | 4 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Few. |
| 15972 | U.S.N.M. | 2 | D5358... | 6 06 40 N.; 118 18 15 E.. | ....... | ....... | co., s......... | Few. |

### OPERCULINA DISCOIDALIS (d'Orbigny), var. INVOLUTA, new variety.

*Description.*—Differing from the typical in that the test, instead o being complanate, is more or less involute. The test is usually more smooth than the type form.

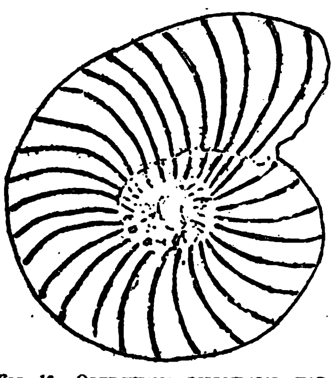

FIG. 16.—OPERCULINA DISCOIDALIS, VAR. INVOLUTA, NEW VARIETY. SIDE VIEW, × 20. FROM STATION D5172.

This occurs at 12 stations in the area: Balayan Bay and Verde Island Passage; Sulu Sea, off western Mindanao; vicinity of Jolo; Sulu Archipelago; Tawi Tawi Group; Sogod Bay; southern Leyte; Gulf of Davao; China Sea, off southern Luzon; and Sibuko Bay, Borneo.

There are a few intermediate forms which seem to show that this involute variety should be placed with *O. discoidalis* rather than with any of the other species of the region. Some of the specimens are involute from the beginning; others become so after an early, more open development.

*Operculina discoidalis*, var. *involuta*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 10+ | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk.gn.m.... | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5114... | 13 36 11 N.; 120 42 26 E.. | 340 | ....... | fne.s........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5133... | Island off Panabutan Point, N.; 52 E., 1.5 miles. | 38 | ....... | gn.m.,s..... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s.,sh........ | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5144... | 6 06 50 N.; 121 02 15 E.. | 19 | ....... | co.s.,sh..... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5156... | 5 12 50 N.; 119 55 55 E.. | 18 | ....... | fne.s........ | Frequent. |
| [illegible] | U.S.N.M. | 5 | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co.s.......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 119 53 08 E.. | 16 | ....... | fne.s........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy.s.,m..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft.m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn.m.,s..... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk.gn.m.... | Rare. |

### OPERCULINA GRANULOSA Leymerie.

*Operculina granulosa* Leymerie, Mém. Soc. géol. France, ser. 2, vol. 1, 1846, p. 359, pl. 13, figs. 12, *a*, *b*.

To this species described by Leymerie from the Eocene of France are referred specimens from Tacloban Anchorage, where they occurred in great numbers, and from D5276, China Sea, vicinity of southern Luzon, 18 fathoms (33 meters). This is a close-coiled form, with a fairly large proloculum, very numerous chambers, larger size, with a definite keel; the others with the sutures ornamented by lines of tubercles, in the last development becoming solid lines; the test composed of usually about two and one-half coils.

These are referred with a question to Leymerie's species and are the only ones in the area which seem like that figured by the author, and it is doubtful if they really are the same.

*Operculina granulosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| [illegible] | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh.,p.,s..... | Frequent. |
| [illegible] | U.S.N.M. | 10+ | .......... | Tacloban Anchorage, P. I. | ...... | ....... | .............. | Frequent. |

### OPERCULINA ELEGANS, new species.

Plate 97, fig. 3.

*Description.*—Test biconvex, smooth, and polished, translucent, usually of a brown color; somewhat involute; sutures of clear shell material, but not ornamented; periphery bluntly rounded.

*Distribution.*—Type specimen (Cat. No. 15988, U.S.N.M.) from *Albatross* station D5579, off Darvel Bay, Borneo.

This seems to be much different from any of the other species described, and probably represents a localized species in this particular region.

*Operculina elegans—Material examined.*

| Cat. No. | Coll. of— | No. specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15968 | U.S.N.M. | 4 | D5579... | 4 54 18 N.; 119 09 52 E.. | 175 | 55.3 | fne. s., Co.... | Few. |
| 15967 | U.S.N.M. | 2 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Few. |

### OPERCULINA AMMONOIDES (Gronovius).

*Nautilus ammonoides* Gronovius, Zooph. Gron., 1781, p. 282, pl. 19, figs. 5, 6.
*Operculina ammonoides* Parker and Jones, Introd. Foram., 1862, Appendix, p 310.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 745, pl. 112 figs. 1, 2.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 37, pl. 14, fig. 7.—Heron-Allen and Earland, Trans. Zool. Soc., London, vol. 20, 1915, p. 737.

This species is recorded by Brady in the Philippines in 95 fathom (174 meters), and by Heron-Allen and Earland as "not uncommo in some dredgings we have from off Cebu (Philippine Islands), bu the specimens are all very small compared with our British records.'

All but one of the stations at which the specimens were found i the Philippine collection are from more than 100 fathoms (183 meters), and, except for this station, they range from 138 to 805 fathoms (252 to 1,472 meters); bottom temperatures are not low, and except for two at 42.3° F. and 47.5° F. (5.7° C. and 8.6° C.), the range from 50.5° F. to 58.3° F. (10.2° C. to 14.6° C.).

The usual habitat for this species is comparatively deep and col water, yet at several stations numerous specimens were found They are all very typical and are not of large size, as has already bee noted by Heron-Allen and Earland in their material from off Cebu

*Operculina ammonoides—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15834 | U.S.N.M. | 8 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m... | Frequent. |
| 15835 | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 26 E.. | 340 | ....... | fne. s........ | Rare. |
| 15836 | U.S.N.M. | 5 | D5115... | 13 37 11 N.; 120 43 40 E.. | 340 | ....... | ............... | Few. |
| 15837 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E.. | 12 | ....... | s.............. | Rare. |
| 15838 | U.S.N.M. | 3 | D5215... | 12 31 30 N.; 123 35 24 E.. | 604 | 50.5 | gn. m........ | Few. |
| 15839 | U.S.N.M. | 10 | D5216... | 12 52 00 N.; 123 23 30 E.. | 215 | 51.9 | gn. m........ | Common. |
| 15840 | U.S.N.M. | 3 | D5222... | 13 38 30 N.; 121 42 15 E.. | 195 | 52.8 | gn. m........ | Few. |
| 15841 | U.S.N.M. | 1 | D5284... | 13 42 05 N.; 120 30 45 E.. | 422 | 42.3 | gy. m., glob. | Rare. |
| 15842 | U.S.N.M. | 1 | D5526... | 9 12 45 N.; 123 45 30 E.. | 805 | 52.3 | gn. m., glob. | Rare. |
| 15843 | U.S.N.M. | 1 | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 58.3 | fne. co. s.... | Rare. |
| 15844 | U.S.N.M. | 2 | D5666... | 2 54 30 S.; 118 47 00 E.. | 272 | 47.5 | gn. m....... | Rare. |

### OPERCULINA VENOSA (Fichtel and Moll).

*Nautilus venosus* Fichtel and Moll, Test. Micr., 1798, p. 59, pl. 8, figs. *e-h*.
*Nummulites venosa* Chapman, Proc. Zool. Soc. London, 1895, p. 47.
*Operculina venosa* Chapman, Proc. Roy. Soc. Victoria, vol. 26, 1913, p. 173.
*Amphistegina cumingii* Carpenter, Philos. Trans., 1859, p. 32, pl. 5, figs. 13–17.
*Nummulites cumingii* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 749, pl. 112, figs. 11-13; woodcut, fig. 22.—Bagg, Proc. U. S. Nat. Mus., vol, 34, 1908, p. 166.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 4, 1914, p. 39, pl. 14, fig. 6.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 739.

There is a well-marked development of this species in certain parts of the areas, especially in shallow warm waters among the islands. At some stations it is very abundant and shows well the development of the species. Brady's figures in the *Challenger* report illustrate the early stages of this species, but the Philippine specimens show later characters. These consist of a broadening of the test and the development of a thin flangelike portion at the periphery. The edge of the test is marked by the development of a round carina, which is finely longitudinally striate, similar to what is found in other species of *Operculina*. Many of the specimens have the sutural lines broader than those figured by Brady, and of very clear shell material, through which the supplementary canals can be seen as white lines.

It has occurred at the following localities: China Sea, off southern Luzon; Sulu Archipelago, near Basilan Island; vicinity of Jolo; vicinity of Siasi; Tawi Tawi Group; off Romblon; off northern Cebu; Sogod Bay, southern Leyte; and between Burias and Luzon.

Brady records this species in 95 fathoms (174 meters) from the Philippine Islands from dredgings of the *Challenger*. It seems to be limited to the Indo-Pacific region.

There are certain large specimens which seem to be microspheric, in which the flangelike portion is greatly developed, which grow to a size nearly 15 mm. in diameter.

Chapman (1913, above) mentions that "in my own cabinet there is a series of tests of this form from the East Indian Archipelago, which shows extreme modifications, ending with the typical *Operculina*." Also, according to Chapman, "*Operculina venosa* is found on parts of the Australian coast at the present day, in the neighborhood of the Great Barrier Reef."

If this species, as it certainly seems, is an *Operculina* instead of a species of *Nummulites*, it means that there are to-day no living species of the latter genus which suddenly became so abundant in the Eocene. As other genera of that period represented by complex tests, such as *Orthophragmina* and *Lepidocyclina*, have become extinct, it is not strange that *Nummulites* may also have died out.

*Operculina venosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15642 | U.S.N.M. | 10 | D5106... | 14 23 56 N.; 120 32 33 E... | 37 | ....... | gy. m......... | Common. |
| 15643 | U.S.N.M. | 10 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s......... | Common. |
| 15679 | U.S.N.M. | 10+ | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., co......... | Common. |
| 15644 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| 15645 | U.S.N.M. | 10+ | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s......... | Common. |
| 15646 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s......... | Common. |
| 15647 | U.S.N.M. | 10+ | D5143... | 6 06 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Common. |
| 15648 | U.S.N.M. | 7 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Common. |
| 15649 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh...... | Common. |
| 15650 | U.S.N.M. | 3 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh...... | Few. |
| 15651 | U.S.N.M. | 1 | D5148... | 5 35 40 N.; 120 47 30 E... | 21 | ....... | co. s., sh...... | Few. |
| 15652 | U.S.N.M. | 5 | D5149... | 5 33 00 N.; 120 42 10 E... | 10 | ....... | co. s., sh...... | Few. |
| 15653 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 16 45 E... | 34 | ....... | wh. s......... | Few. |
| 15654 | U.S.N.M. | 9 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Common. |
| 15655 | U.S.N.M. | 7 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Common. |
| 15656 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Rare. |
| 15657 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 87 | 75.7 | hrd. s......... | Rare. |
| 15658 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| 15659 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m...... | Rare. |
| 15660 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |

## Genus HETEROSTEGINA d'Orbigny, 1826.

This genus, which is comparatively abundant in certain parts of the area, especially in the region of the Sulu Archipelago, is not represented by the usual species of the genus, but by two other forms, one of which is very abundant and grows to a large size.

### HETEROSTEGINA DEPRESSA d'Orbigny, var. TUBERCALATA Moebius.

*Heterostegina tubercalata* MOEBUIS, Beitr. Meeresfauna Insel Mauritius, 1880, p. 107, pl. 12, figs. 3–7.

This variety differs from the typical form of the species in that the earlier portion has numerous fine tubercles scattered over the surface; usually also the central portion is slightly thickened, the remaining part of the test being flat and complanate. None of the specimens show the typical smooth form which is characteristic of the typical form of the species. The types of d'Orbigny's *H. depressa* were from the Island of St. Helena.

This variety was especially abundant at *Albatross* station D5152, in 34 fathoms (62 meters), off Tawi Tawi group, Sulu Archipelago. It has also occurred in the following localities: Sogod Bay, southern Leyte; China Sea, off southern Luzon; and between Negros and Siquijor. It is only abundant in shallow water, the deeper stations being represented usually by single specimens. Moebius described this form from the shallow water of Mauritius.

*Heterostegina depressa*, var. *tuberculata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15491 | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Common. |
| 15492 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Rare. |
| 15493 | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Rare. |
| 15494 | U.S.N.M. | 1 | D5262... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Rare. |
| 15495 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m........ | Rare. |

### HETEROSTEGINA SUBORBICULARIS d'Orbigny.

*Heterostegina suborbicularis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 305.—FORNASINI, Boll. Soc. Geol. Ital., vol. 22, 1903, pl. 14, fig. 6.

This species, not described by d'Orbigny, but later figured in his planchés inèdites as published by Fornasini, seems to be the commonest in this region. Its whole appearance is very different from that of *H. depressa*, it being much thicker, strongly biconvex in the central portion, then later developing a compressed, broadly flaring portion which is thin near the periphery. The entire test is smooth and the subdivisions do not appear until a considerable amount of the test is built. These then appear near the periphery and gradually develop across the chambers of the test. The sutures in the early portion of the test are nearly straight, and remind one of those in *Operculina venosa*, which the early part of the test strongly resembles. The peripheral edge of the test is acute, except in very large specimens, where the border becomes thickened and somewhat carinate. Specimens attain a growth of 8 mm. or more. The species is abundant in warm, shallow waters, where it often makes up a large proportion of the bottom.

D'Orbigny described this species from the Hawaiian Islands as variety A, and variety B from the Marianna Islands, and from Port Jackson, Australia; therefore it is evidently a species of Indo-Pacific regions. Alcoholic specimens which were collected at D5179, off Romblon, show a green color, probably due to large numbers of symbiotic algae which occur in the test. Heron-Allen and Earland also note this character in *H. depressa* from the Kerimba Archipelago.

This species has occurred in the following localities: China Sea, off southern Luzon; Sulu Archipelago, near Basilan Island; vicinity of Jolo; vicinity of Siasi; near Tawi Tawi; off Romblon; between Burias and Luzon; Gulf of Davao; and Buton Strait.

*Heterostegina suborbicularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15496 | U.S.N.M. | 10+ | D5106 | 14 23 55 N.; 120 33 23 E. | 37 | | gy. m. | Common. |
| 15497 | U.S.N.M. | 1 | D5109 | 14 08 45 N.; 120 16 30 E. | 10 | | co. | Rare. |
| 15498 | U.S.N.M. | 1 | D5124 | 6 44 45 N.; 121 48 00 E. | 25 | | fne. s. | Rare. |
| 15499 | U.S.N.M. | 8 | D5128 | 6 06 00 N.; 121 02 30 E. | 20 | | co. s. | Few. |
| 15500 | U.S.N.M. | 7 | D5129 | 6 06 00 N.; 121 02 30 E. | 20 | | co. s. | Few. |
| 15501 | U.S.N.M. | 7 | D5141 | 6 09 00 N.; 120 58 00 E. | 29 | | co. s. | Few. |
| 15502 | U.S.N.M. | 10+ | D5142 | 6 06 10 N.; 121 02 40 E. | 21 | | co. s. | Common. |
| 15503 | U.S.N.M. | 2 | D5143 | 6 05 50 N.; 121 02 15 E. | 19 | | co. s. | Rare. |
| 15504 | U.S.N.M. | 2 | D5144 | 6 05 50 N.; 121 03 15 E. | 19 | | co. s. | Rare. |
| 15505 | U.S.N.M. | 2 | D5145 | 6 04 30 N.; 120 59 30 E. | 23 | | co. s., sh. | Rare. |
| 15506 | U.S.N.M. | 2 | D5147 | 5 41 40 N.; 120 47 10 E. | 21 | | co. s., sh. | Rare. |
| 15507 | U.S.N.M. | 3 | D5148 | 5 35 40 N.; 120 47 30 E. | 17 | | co. s. | Few. |
| 15508 | U.S.N.M. | 5 | D5149 | 5 33 00 N.; 120 42 10 E. | 16 | | co., sh. | Few. |
| 15509 | U.S.N.M. | 4 | D5151 | 5 24 40 N.; 120 27 10 E. | 24 | | co. s., sh. | Few. |
| 15510 | U.S.N.M. | 1 | D5152 | 5 22 55 N.; 120 15 45 E. | 34 | | wh. s. | Few. |
| 15511 | U.S.N.M. | 4 | D5154 | 5 14 50 N.; 119 58 45 E. | 40 | | co. s., sh. | Few. |
| 15512 | U.S.N.M. | 10+ | D5179 | 12 38 15 N.; 122 12 30 E. | 37 | 75.7 | hrd. s. | Frequent. |
| 15513 | U.S.N.M. | 1 | D5184 | 10 18 30 N.; 123 23 30 E. | 565 | 49.8 | gn. m. | Rare. |
| 15514 | U.S.N.M. | 4 | D5198 | 9 40 50 N.; 123 39 45 E. | 220 | 53.9 | gn. m. | Few. |
| 15515 | U.S.N.M. | 10+ | D5218 | 13 11 15 N.; 123 02 45 E. | 30 | | crs. s. | Frequent. |
| 15516 | U.S.N.M. | 3 | D5250 | 7 06 07 N.; 125 39 45 E. | 23 | | co. s. | Few. |
| 15517 | U.S.N.M. | 5 | D5255 | 7 08 00 N.; 125 39 00 E. | 160 | | sft. m. | Rare. |
| 15518 | U.S.N.M. | 1 | D5276 | 13 49 15 N.; 120 14 45 E. | 18 | | sh., p., s. | Rare. |
| 15519 | U.S.N.M. | 3 | D5286 | 13 40 09 N.; 120 57 45 E. | 210 | | m., s. | Rare. |
| 15520 | U.S.N.M. | 1 | D5529 | 9 23 45 N.; 123 39 30 E. | 441 | 53 | gy. m., glob. | Rare. |
| 15521 | U.S.N.M. | 1 | D5572 | 5 31 26 N.; 120 00 45 E. | 294 | 52.3 | s. | Rare. |
| 15522 | U.S.N.M. | 4 | D5579 | 4 54 15 N.; 119 09 52 E. | 175 | 55.3 | fne. s., Co. | Rare. |
| 15523 | U.S.N.M. | 3 | D5580 | 4 58 45 N.; 119 06 45 E. | 182 | 55.8 | br. s., Co. | Few. |
| 15524 | U.S.N.M. | 1 | D5640 | 4 27 00 S.; 122 55 40 E. | 24 | | s., brk. sh. | Rare. |

## Genus CYCLOCLYPEUS Carpenter, 1856.

### CYCLOCLYPEUS GUEMBELIANUS H. B. Brady.

*Cycloclypeus* Carpenter, Philos. Trans., vol. 146, 1856, p. 555, pl. 30, figs. 1 and 3; Introd. Foram., 1862, p. 292.

*Cycloclypeus guembelianus* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 66; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 751, pl. 111, figs. 8*a*, *b* (young form).

*Cycloclypeus carpenteri* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 67; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 751.—Lister, Philos. Trans., vol. 186B, 1895, pp. 437, 438, pl. 9, figs. 52–54.—Chapman, Journ. Linn. Soc., vol. 28, 1900, p. 22, pl. 2, figs. 6, 7: pl. 3, figs. 1–5.

Brady gave this species a name in the *Challenger* Report, but gives almost no description. He mentions, however, that "some of these specimens are almost unique amongst discoidal Foraminifera in the point of size, presenting a diameter of 2½ inches (63 mm.)." Carpenter's genus was founded on this large species, which comes from "a considerable depth of water off the coast of Borneo." The *Challenger* material gave little to add to the knowledge of this species. However, it has been found occasionally since that time, as the above references show. The *Albatross* dredged this species in great quantity at D5179, off Romblon, in 37 fathoms (68 meters), and some of these specimens were preserved in a large-mouthed fruit jar, in which was a note saying that other specimens in the same dredging were *too* large to be placed in the jar. The largest specimens fully equaled those described by Brady, and it is therefore the largest of the living foraminifera and only equaled in size by a few fossil species of *Lepidocyclina*. The test is very thin and fragile and easily becomes broken in the dredging.

It has occurred in large quantities at D5184, between Panay and Negros, 565 fathoms (1,033 meters); D5356, North Balabac Strait, 58 fathoms (106 meters); and D5640, Buton Strait, 24 fathoms (44 meters). It is evidently not a widely distributed species, and probably represents one of those older types which are now only found living in this particular region.

At station D5179, where the species was so abundant, there are specimens which have a secondary portion, due to a secondary outgrowth from near the center, so the specimens become composed of three almost equal portions, one of these, however, usually at a greater angle, so that the original plane of the surface can be seen.

*Cycloclypeus guembelianus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E.. | 78 | 75.7 | fne. s........ | Abundant. |
| [illegible] | U.S.N.M. | 1 | D5184... | 10 18 30 N.; 122 28 30 E.. | 565 | 49.8 | gn. m....... | Common. |
| 1561 | U.S.N.M. | 2 | D5356... | 8 06 40 N.; 117 18 45 E.. | 58 | ....... | s., sh......... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. s.... | Abundant. |

## Family MILIOLIDAE.

## Subfamily CORNUSPIRININAE.

### Genus CORNUSPIRA Schultze, 1854.

### CORNUSPIRA FOLIACEA (Philippi).

Plate 77, fig. 1.

*Orbis foliaceus* PHILIPPI, Enum. Moll. Siciliae, vol. 2, 1844, p. 147, pl. 24, fig. 26.
*Cornuspira foliacea* CARPENTER, PARKER, and JONES, Introd. Foram., 1862, p. 68, pl. 5, fig. 16.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 199, pl. 11, figs. 5-9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 24 pl. 1, fig. 1; pl. 2, fig. 1.

Specimens have occurred well scattered over the Archipelago proper, east and west coasts of Luzon, northern and eastern Mindanao, off Cebu and in Jolo Sea, depths ranging from 32 to 500 fathoms (59 to 914 meters), and bottom temperatures from 41.2° to 52.3° F. (5.1° to 11.2° C.). Outside the Archipelago specimens were obtained from D5613 in 752 fathoms (1,375 meters), Gulf of Tomini, Celebes; and D5668, in 901 fathoms (1,648 meters), Macassar Strait, bottom temperature 38.2° F. (3.4° C.).

The only station at which specimens were at all common is D5236 in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao.

Taken as a whole the specimens are very typical in size and general characters, at least for warm, comparatively shallow water. None of the specimens has a greater diameter than 3 mm. The species reaches its greatest development both in size and the amount of its spread in colder waters. The finest specimens I have ever seen were from the Arctic, while those of the colder parts of the North Atlantic reach large dimensions.

In the general faunal area it is known from the Hawaiian Islands (Bagg, Cushman) in the east to the Kerimba Archipelago, off south eastern Africa (Heron-Allen and Earland), and Mauritius (Egger) from southern Japan (Cushman) in the north to Raine Island, and Kandavu (Brady). In nearly all cases it is noted that the specimens from this region are of comparatively small size and rather close coiled. I noted this in the Philippine material, and it is confirmed by the following notes:[32]

> Although tolerably abundant and widely diffused, the specimens are feeble, none of them exhibiting the rapid increase in size of the outer convolution which is characteristic of the species.

Heron-Allen and Earland:[33]

> All the specimens are small and of the true Philippi type; none of the broad divergent type * * * were found at Kerimba.

It may be that Costa's name *ammonitiformis* should be applied to this smaller and more closely coiled form, and *foliacea* Philippi applied to the larger, more flaring form from colder and deeper water elsewhere.

*Cornuspira foliacea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10718 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E.. | 22 | ....... | gn, s......... | Few. |
| 10719 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 10726 | U.S.N.M. | 1 | D5612... | 0 42 00 S.; 121 44 00 E... | 753 | ....... | gy. m....... | Rare. |
| 10727 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Rare. |
| 10720 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | co. s.......... | Few. |
| 10721 | U.S.N.M. | 1 | D5433... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m....... | Rare. |
| 10722 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m....... | Few. |
| 10723 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ....... | Rare. |
| 10724 | U.S.N.M. | 1 | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for. | Rare. |
| 10725 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E.. | 315 | 52.3 | Co., s ....... | Rare. |

### CORNUSPIRA FOLIACEA (Philippi), var. EXPANSA Chapman.

Plate 77, fig. 2.

*Cornuspira carinata* COSTA, var. *expansa* CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 12, pl. 1, fig. 3.

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[32] Millett, Journ. Roy. Micr. Soc., 1898, p. 612.

[33] Trans. Zool. Soc., vol. 20, 1915, p. 592.

*Description.*—Test differing from the typical in the character of the peripheral border, which is definitely thickened with a rounded periphery.

Chapman described this form as a variety of *C. carinata*, but in the Philippines it has seemed to be much more closely allied to *C. foliacea*. It occurs but once at the same station with *C. carinata*. Chapman's original notes are as follows:

> In this variety the tests partake of the characters of both *C. carinata* Costa, sp., and *C. foliacea* Philippi, sp. The test, although increasing rapidly in width, as in *C. foliacea*, is, however, depressed on the sides, and even tends to become concave, as in typical examples of *C. carinata*. The larger specimen of the varietal form has a diameter of 1.23 mm.
>
> Forty miles south of Cape Wiles (South Australia, lat. 35° 35′ S.; long. 135° 15′ E.) 100 fathoms. Two examples, identical in varietal form.

The variety has occurred in the *Albatross* Philippine material at seven stations, ranging in depth from 135 to 700 fathoms (247 to 1,280 meters), the average 415 fathoms (759 meters). Bottom temperatures given at four of these stations range from 49.3° F. to 59° F. (9.6° C. to 15° C.), the average 53.7° F. (12.1° C.). The localities include China Sea, off southern Luzon; off northwestern Panay; east coast of Luzon; between Siquijor and Bohol Islands; between Negros and Siquijor; and in the region southward it has occurred south of Patiente Strait and off Bouro Island.

This probably is a widely spread species in the Indo-Pacific region in water of 100 fathoms (183 meters), or more from the various records now known.

*Cornuspira foliacea*, var. *expansa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10728 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gn. m... | Few. |
| 10729 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| 10730 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net). | Few. |
| 10731 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Few. |
| 10732 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Few. |
| 10733 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E.. | 559 | ....... | co. s., m..... | Few. |
| 10734 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Few. |

### CORNUSPIRA INVOLVENS Reuss.

Plate 77, figs. 3, 4.

*Operculina involvens* Reuss, Denkschr. Akad. Wiss. Wien, vol. 1, 1849, p. 370, pl. 45, fig. 20.

*Cornuspira involvens* Reuss, Sitz. Akad. Wiss. Wien, vol. 48. 1863 (1864), p. 39, pl. 1, fig. 2.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 200, pl. 11, figs. 1-3.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 25, pl. 1, fig. 2; pl. 2, fig. 2.

This is by far the most common species of the genus in the region, being widely distributed, but nowhere common. All the stations but one are within the Archipelago, and range in depth from 78 to 569 fathoms (143 to 1,040 meters); bottom temperatures range from 41.2° to 59.6° F. (5.1 to 15.3° C.). These stations embrace the following general localities: Off Romblon; western Bohol; Panay; Verde Island Passage; off southern Luzon; eastern Luzon; off Mindanao; between Siquijor and Bohol; Negros and Siquijor; and Sulu Sea.

A few specimens were found at D5590, Sibuko Bay, Borneo, in 310 fathoms (567 meters), bottom temperature 44.3° F. (6.8° C.).

Heron-Allen and Earland [34] note that in their material from the Kerimba Archipelago "two or three distinct types occur" and give notes on the various forms. It probably indicates that if this and other widely distributed species are closely studied various forms may be distinguished.

*Cornuspira involvens—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10738 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s..... | Rare. |
| 10739 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Rare. |
| 10740 | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E... | 220 | 53.9 | gn. m....... | Rare. |
| 10741 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| | | 2 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| 10742 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Rare. |
| 10743 | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 59.6 | fne. s.,m.,sh. | Rare. |
| 10744 | U.S.N.M. | 1 | D5468... | 13 35 39 N.; 123 40 48 E... | 569 | ....... | gn. m....... | Rare |
| 10745 | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s. | Rare. |
| 10746 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............. | Rare. |
| 10747 | U.S.N.M. | 1 | D5529... | 9 23 45 N.; 123 39 20 E... | 441 | 53.0 | gy. m., glob. | Rare. |
| 10748 | U.S.N.M. | 2 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Few. |
| 10749 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob.. | Rare. |
| 10750 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............ | Rare. |
| 10751 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Few. |

### CORNUSPIRA INVOLVENS Reuss, var. SUBSTRIATULA, new variety.

Plate 77, fig. 5.

*Description.*—Test similar to the typical in general characters, but the exterior, instead of smooth, is marked by numerous fine longitudinal striations.

*Distribution.*—Type specimen (U.S.N.M. No. 10752) from *Albatross* station D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao, bottom temperature 41.2° F. (5.1° C.). Specimens were common at this station, while very few of the typical form occurred. The variety was also noted from the following stations: D5282, in 248 fathoms (454 meters), China Sea, off southern Luzon, bottom temperature 47.4° F. (8.5° C.); D5567 in 268 fathoms (491 meters), bottom temperature 52.0° F. (11.1° C.); and D5571, in 340 fathoms (622 meters), bottom temperature 52.3° F. (11.2° C.), both north of Tawi Tawi.

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[34] Trans. Zool. Soc., vol. 20, 1915, p. 593.

*Cornuspira involvens, var. substriatula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| [illegible] | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Common. |
| [illegible] | U.S.N.M. | 2 | D5282... | 13 53 00 N.; 120 26 45 E... | 248 | 47.4 | dk. gy. s..... | Few. |
| [illegible] | U.S.N.M. | 2 | D5567... | 5 48 00 N.; 120 33 45 E... | 268 | 52.0 | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh........ | Rare. |

## CORNUSPIRA LACUNOSA H. B. Brady.

Plate 78, fig. 1.

*Cornuspira lacunosa* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 202, pl. 113, fig. 21.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 26, pl. 2, fig. 3.

Specimens of this rare species seem to confirm what was noted in the North Pacific material that the type figured by Brady was an immature specimen. In the adults the latter portion becomes nearly smooth and the last-formed coil wider. The size of the Philippine specimens also is nearer that of the Japanese material of this species.

Single specimens were obtained from the following stations: D5178 in 78 fathoms (143 meters), off Romblon; D5259, in 312 fathoms (571 meters), off northwestern Panay, bottom temperature 49.3° F. (9.6° C.); and D5281 in 201 fathoms (368 meters), China Sea, off southern Luzon, bottom temperature 50.4° F. (10.2° C.).

These few specimens confirm what I have already noted at some length in regard to the adult form of this species and its relation to what was evidently the young described by Brady from off Raine Island, Torres Strait, 155 fathoms (283 meters). The other material is that which I had from southern Japan. This species, while evidently of widespread distribution in the Indo-Pacific area, can not be very common, from the scattered records and few specimens at each station. The Philippine specimens are all microspheric.

*Cornuspira lacunosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10735 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| 10736 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Rare. |
| 10737 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 26 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |

### CORNUSPIRA CARINATA (Costa).

Plate 77, fig. 6.

*Operculina carinata* Costa, Atti. Accad. Pont., vol. 7, 1856, p. 209, pl. 17, figs. 15, *a*, *b*.

*Cornuspira carinata* Seguenza, Atti. Accad. Gioenia di Sci. Nat., vol. 18, 1862, p. 93.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 201, pl. 11, figs. 4*a*, *b*.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 247, pl. 3, figs. 16, 17.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 11.

*Description*.—Test close-coiled, not flaring, increasing regularly in diameter; tube somewhat compressed laterally, the sides convex; peripheral margin with a thin but sharply defined narrow keel; surface smooth, aperture broadly elliptical.

Diameter up to 3 mm.

This is not a common species in the Pacific from the available records, yet its occurrence in the Philippine region at several stations with the records from off Raine Island, Torres Strait, 155 fathoms (283 meters), rare (Brady), and off the east coast of Australia in 465 fathoms (850 meters) (Sidebottom), show that it is well distributed in the Indo-Pacific. Egger recorded it from western Australia, from Mauritius, and from near New Amsterdam, extending the distribution westward across the Indian Ocean.

In the *Albatross* Philippine dredgings there are records from ten stations, ranging in depth from 297 to 890 fathoms (543 to 1,628 meters). These are off Baylayan Bay; Sogod Bay, southern Leyte; off northwestern Panay; west coast of Luzon; off northern Mindanao; north of Tawi Tawi; and to the southward off Darvel Bay and Sibuko Bay, Borneo.

*Cornuspira carinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10706 | U.S.N.M. | 1 | D5114... | 13 36 11 N.; 120 45 36 E... | 340 | ....... | fne. s........ | Rare. |
| 10715 | U.S.N.M. | 5 | D5269... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 10707 | U.S.N.M. | 3 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Few. |
| 10708 | U.S.N.M. | 1 | D5429... | 9 41 30 N.; 118 50 22 E... | 706 | ....... | gn. m....... | Rare. |
| 10709 | U.S.N.M. | 1 | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | Rare. |
| 10710 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............. | Rare. |
| 10711 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Rare. |
| 10712 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s. | Rare. |
| 10713 | U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | Rare. |
| 10714 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Rare. |

### CORNUSPIRA CRASSISEPTA H. B. Brady.

Plate 84, fig. 1.

*Cornuspira crassisepta* H. B. Brady, Proc. Roy. Soc. Edinburgh, vol. 11, 1882, p. 714; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 202, pl. 113, fig. 20.—Howchin, Trans. Roy. Soc. South Australia, vol. 12, 1889, p. 4.—Egger, Abh. kön. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 246, pl. 3, fig. 22.—Chapman, Journ. Linn. Soc., Zoology, vol. 30, 1907, p. 22, pl. 2, fig. 45; p. 399, *Description.*—"Test discoidal, biconcave, peripheral edge nearly square; convolutions very numerous and very narrow near the center; spinal septal wall thick, and marked externally by a raised limbate line.

"Diameter, one-fiftieth of an inch (0.5 mm.) or rather more."

Brady described this species from specimens dredged in the "warm area" of the Faroe Channel. It is known from the work of Howchin, and especially that of Chapman, to be "to be the most abundant of the *Cornuspirae* in the Tertiaries of southeastern Australia." Egger records it in recent dredgings from *Gazelle*. stations off Mauritius and off western Australia. Therefore it is not surprising to find it present in the *Albatross* Philippine material.

The specimen figured by Brady has a broader and more irregular thickening than our specimens. The few I have had agree very closely with that figured by Chapman as noted in the reference above. Except for this difference the specimens are very much alike. They were microspheric, as were Brady's and Chapman's figured specimens. The squarely truncate peripheral margin is very evident.

The species was rare at two stations—D5236, off the east coast of Mindanao in 494 fathoms (903 meters), and D5348, Palawan Passage, in 375 fathoms (686 meters).

*Cornuspira crassisepta—Materials examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co., s........ | Rare. |

## Genus OPTHALMIDIUM Zwingli and Kübler, 1870.

### OPTHALMIDIUM INCONSTANS (H. B. Brady).

Plate 78, figs. 2, 3.

*Hauerina inconstans* H. B. Brady, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 54.

*Opthalmidium inconstans* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 189, pl. 12, figs. 5, 7, 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 28, pl. 3, figs. 1–4.

Except at one station, D5236, where specimens were fairly frequent, the species has occurred only as scattered specimens: Sulu Sea; Verde Island Passage; east coast Mindanao; off northwestern Panay; southern Luzon; Palawan Passage; also from Sibuko Bay, Borneo (stations D5585, 5586), and D5637 in 700 fathoms (1,280 meters), vicinity of Bouro Island. The depths in the Archipelago proper range from 201 to 494 fathoms (368 to 903 meters), the greater depth, that of D5236, where the specimens were most frequent. Some of the specimens are fine and large but all were very typical.

In the Indo-Pacific region the species is known from off Funafuti (Chapman), off western Australia (Egger), and off the east coast of Australia (Sidebottom).

A part of the material referred by Sidebottom to *Spiroloculina nitida* d'Orbigny[35] seems to be *Opthalmidium inconstans*, especially figure 6, which is very typical. This may be compared to the figure I have given[36] of the optical section.

*Opthalmidium inconstans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 484 | 41.2 | fne. gy. s.... | Frequent. |
| | | | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | |
| | | | D5586... | 4 06 50 N.; 118 47 20 E.. | 415 | 42.3 | Co., s........ | |
| | | | D5637... | 3 53 30 S.; 126 48 00 E... | 700 | ....... | gy. m....... | |

## Genus SPIROLOCULINA d'Orbigny, 1826.

### SPIROLOCULINA DEPRESSA d'Orbigny.

Plate 81, fig. 2; plate 100, figs. 4, 5.

*Spiroloculina depressa* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 298.—WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 82, pl. 7, fig. 177.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 29, pl. 3, figs. 6–10.

*Spiroloculina limbata* H. B. BRADY (not d'Orbigny), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 150, pl. 9, figs. 15–17.

This widely distributed species, characteristic of open ocean, is rare in the Philippine region. The four stations represented the following localities: China Sea, off Formosa; Sulu Sea, off western Mindanao; and between Burias and Luzon.

*Spiroloculina depressa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° F. | | |
| 10955 | U.S.N.M. | 5 | D5132... | Island off Panabutan Point, N. 15°; W., 0.3 m. | 26 | ....... | gn. m., s.... | Frequent. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 10956 | U.S.N.M. | 2 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Few. |
| 10957 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 349 | ....... | s., br. Co.... | Few. |
| 10958 | U.S.N.M. | 1 | D5353... | 12 51 30 N.; 123 26 15 E.. | 226 | 51.4 | sft. gn. m.... | Few. |

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[35] Journ. Roy. Micr. Soc., 1918, pl. 1, figs. 5, 6 (not fig. 7).

[36] Bull. 71, U. S. Nat. Mus., pt. 6, 1917, pl. 3, fig. 3.

### SPIROLOCULINA CANALICULATA d'Orbigny.

Plate 80, figs. 3 *a*, *b*.

*Spiroloculina canaliculata* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 269, pl. 16, figs. 10–12.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 30, pl. 4, figs. 1–3.

*Spiroloculina impressa* H. B. BRADY (not Terquem), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 151, pl. 10, figs. 3, 4.

This species is characterized by the deeply concave periphery between the sharply extended sides of the chambers.

It occurs in characteristic form at 24 stations in the region, ranging in depth from 18 to 1,262 fathoms (33 to 2,309 meters), the average 204 fathoms (373 meters). Bottom temperatures for the 10 stations recorded range from 44.3° to 75.7° F. (6.8° to 24.2° C.), with the average slightly less than 57° F. (13.8° C.).

The stations at which it is recorded as common are in depths, for the most part, of less than 100 fathoms (183 meters). At the others the specimens were usually few.

The following general localities are represented: Sulu Sea, off western Mindanao; about the Tawi Tawi group and near Basilan; China Sea, off southern Luzon and off Formosa; Palawan Passage, between Leyte and Mindanao; off Romblon; off eastern Panay; off northern Cebu; Sogod Bay, southern Leyte; east of Masbate; between Burias and Luzon; between Marinduque and Luzon; between southeastern Mindoro and Verde Island Passage. These localities cover the Archipelago very well except the open Pacific coast. Southward a few specimens were found at stations in Darvel Bay and Sibuko Bay, Borneo, and from Pitt Passage.

*Spiroloculina canaliculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10861 | U.S.N.M. | 10+ | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Common. |
| 10862 | U.S.N.M. | 3 | D5132... | Island off Panabutan N. 15° W.; 0.3 mile. | 26 | ....... | gn. m., s.... | Few. |
| 10863 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N.; 52° E.; 1.5 miles. | 38 | ....... | gn. m., s.... | Common. |
| 10864 | U.S.N.M. | 2 | D5124... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s........ | Few. |
| 10865 | U.S.N.M. | 8 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wh. s........ | Common. |
| 10866 | U.S.N.M. | 3 | D5153... | 5 13 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh.... | Few. |
| 10867 | U.S.N.M. | 4 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Few. |
| 10868 | U.S.N.M. | 5 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s.... | Few. |
| 10869 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Few. |
| 10870 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m.... | Few. |
| 10871 | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m.... | Rare. |
| 10872 | U.S.N.M. | 9 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Common. |
| 10873 | U.S.N.M. | 6 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn., m... | Common. |
| 10874 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m........ | Few. |
| 10875 | U.S.N.M. | 7 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Common. |
| 10876 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p. s..... | Few. |
| 10877 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s..... | Rare. |
| 10878 | U.S.N.M. | 3 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Few. |
| 10879 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Few. |
| 10880 | U.S.N.M. | 3 | D5338... | 11 38 45 N.; 119 24 45 E.. | 43 | ....... | co. s., m.... | Few. |
| 10881 | U.S.N.M. | 1 | D5495... | 9 06 30 N.; 126 00 20 E.. | 976 | 52.3 | gy. m....... | Few. |
| 10882 | U.S.N.M. | 3 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Few. |
| 10883 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s.... | Few. |
| 10884 | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 42 30 E... | 1,262 | ....... | gy. m., fne.s. | Few. |

### SPIROLOCULINA GRATELOUPI d'Orbigny.

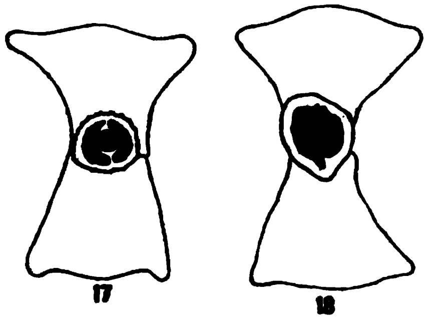
Plate 78, figs. 4*a*, *b*; plate 100, fig. 3.

*Spiroloculina grateloupi* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 298.—TERQUEM, Mém. Soc. géol. France, ser. 3, vol. 1, 1878, p. 52. pl. 5, figs. 5, 6.—WIESNER, Archiv. Prot., vol. 25, 1812, p. 208.—CUSHMAN, Bull. 71, U. S. Nat Mus., pt. 6, 1917, p. 31, pl. 4, figs. 4, 5.

*Spiroloculina excavata* H. B. BRADY (not d'Orbigny), Rep. Voy. *Challenger* Zoology, vol. 9, 1884, p. 151, pl. 9, figs. 5, 6.—HERON-ALLEN and EARLAND Trans. Zool. Soc., London, vol. 20, 1915, p. 554.

The characters of this species include a deeply excavate centra portion, great thickness at the periphery, elongate test; periphera margin broadly convex, the last-formed chamber projecting at both ends of the test, the apertural end with a decided projecting neck and phialine lip.

Both megalospheric and microspheric forms occur, the latter reaching 3 mm. in length.



FIGS. 17, 18.—SPIROCULINA GRATELOUPI D'ORBIGNY. × 50. END VIEWS SHOWING APERTURE AND TEETH. 17, FROM ALBATROSS STATION D5136. 18, FROM ALBATROSS D5136.

Brady's notes in the *Challenger* Report are instructive in regard to this species. Under *S. excavata* he says:

> The most "excavated" specimens take the somewhat elongate contour represented in the drawings, and have the final segment extending a little beyond the rest of the shell. Such forms must be sought chiefly in the shallow water surrounding the coral islands of the Pacific.

Heron-Allen and Earland note in their material from the Kerimba Archipelago off southeastern Africa, under *S. excavata*.

> The typical *S. excavata* has a nearly flat peripheral edge, but the bulk of our specimens are very rounded * * *. This round-edged variety occurs at many stations.

From these notes and an examination of the Philippine material and that from other tropical localities of the Pacific, it seems evident that this species is very well represented if not the dominant species of the genus in the Indo-Pacific. It certainly is different from *S. excavata*, and may be later separated from *S. grateloupi* d'Orbigny.

It is the most common *Spiroloculina* in the Philippine region, especially in shallow water, often occuring in great numbers and not showing any great amount of variation. The microspheric form is much larger and more excavate than the megalospheric.

It has been noted at 32 stations, all but one in the Archipelago or the China Sea, none of them off the Pacific coast in deeper water. It is especially abundant in the shallow water about the Sulu Sea. The only record in the deeper water to the southward is in Sibuko Bay, Borneo.

The depths range from 10 to 554 fathoms (18 to 1,012 meters), the average, however, being about 70 fathoms (128 meters). The bottom temperatures where given range from 43.3° to 75.7° F. (6.1° to 24.2° C.), with the average 58.3° F. (14.6° C.). This is too low, however, as it is only from eight of the deeper stations. Both sets of data show that the species is most at home in shallow, very warm waters.

*Spiroloculina grateloupi—Material examined.*

| [illegible] | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 1 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., sh ... | Few. |
| [illegible] | U.S.N.M. | 2 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Few. |
| [illegible] | U.S.N.M. | 4 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m........ | Common. |
| [illegible] | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Few. |
| [illegible] | U.S.N.M. | 8 | D5133... | Island off Panabutan Point, N. 52° E., 1.5 miles. | 38 | ....... | gn. m., s.... | Common. |
| [illegible] | U.S.N.M. | 10 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s....... | Common. |
| [illegible] | U.S.N.M. | 2 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s.,sh........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E.. | 19 | ....... | s.,Co. ...... | Few. |
| [illegible] | U.S.N.M. | 2 | D5139... | 6 06 00 N.; 121 02 30 E.. | 20 | ....... | co. s........ | Few. |
| [illegible] | U.S.N.M. | 7 | D5145... | 6 04 36 N.; 120 59 30 E.. | 23 | ....... | co. s.,sh.... | Common. |
| [illegible] | U.S.N.M. | 3 | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s.,sh.... | Few. |
| [illegible] | U.S.N.M. | 2 | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co. s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5149... | 5 33 00 N.; 120 42 10 E.. | 10 | ...... | Co.,sh ...... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | oh. s........ | Common. |
| [illegible] | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s........ | Few. |
| [illegible] | U.S.N.M. | 3 | D5156... | 5 12 50 N.; 119 55 55 E.. | 18 | ....... | fne. s.,sh.... | Few. |
| | | | D5157... | 5 12 30 N.; 119 55 50 E.. | 18 | ....... | fne. s.,sh.... | Few. |
| [illegible] | U.S.N.M. | 9 | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s........ | Common. |
| [illegible] | U.S.N.M. | 4 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Few. |
| [illegible] | U.S.N.M. | 2 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m.,fne. s.... | Frequent. |
| [illegible] | U.S.N.M. | 8 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Frequent. |
| [illegible] | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s. m ..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 50.9 | gy. s. m...... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s........ | Common. |
| [illegible] | U.S.N.M. | 2 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Few. |
| [illegible] | U.S.N.M. | 8 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh.,p.,s...... | Common. |
| [illegible] | U.S.N.M. | 6 | D5277... | 13 56 55 N.; 120 13 45 E . | 80 | 58.6 | fne. s........ | Common. |
| [illegible] | U.S.N.M. | 6 | D5478... | 10 46 24 N.; 125 16 30 E.. | 57 | ....... | sh............ | Common. |
| [illegible] | U.S.N.M. | 10 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Common. |
| [illegible] | U.S.N.M. | 7 | D5592... | 4 12 44 N.; 118 27 44 E... | 305 | 43.3 | gn. m........ | Common. |
| [illegible] | U.S.N.M. | 9 | .......... | Jolo Jolo........................ | ....... | ....... | ................ | Common. |

**SPIROLOCULINA GRATELOUPI d'Orbigny, var. INCISA, new variety.**

Plate 78, fig. 5.

*Description.*—Variety differing from the typical in the adding of the chambers, the inner margin of the newly added chamber not being equal to the outer margin of the preceding chamber, thus leaving a distinct sharp ridge between each of two chambers as added. This leaves a series of incised areas with high areas alternating with them.

*Distribution*—Type specimen (Cat. No. 10941, U.S.N.M.) from *Albatross* station D5220, between Marinduque and Luzon, in 50 fathoms (91 meters). It has also occurred at six other stations: Off Romblon; off western Samar; between Burias and Luzon; Palawan Passage; and off Marinduque.

These seven stations ranged in depth from 20 to 106 fathom (37 to 194 meters), the average 64 fathoms (117 meters). Th bottom temperature is given for only two of the stations, averagin nearly 70° F. (21.1° C.).

*Spiroloculina grateloupi*, var. *incisa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10937 | U.S.N.M. | 10+ | D5178 .. | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Common. |
| 10938 | U.S.N.M. | 1 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s..... | Rare. |
| 10939 | U.S.N.M. | 3 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s..... | Frequen |
| 10940 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |
| 10941 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m..... | Common. |
| 10942 | U.S.N.M. | 5 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., m...... | Common. |
| 10943 | U.S.N.M. | 1 | D5360... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | bn. s......... | Rare. |

### SPIROLOCULINA ACUTIMARGO H. B. Brady.

*Spiroloculina acutimargo* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. i 1884, p. 154, pl. 10, figs. 12–15.—EGGER, Abh. kön. bay. Akad. Wiss. Mü chen, Cl. II, vol. 18, 1893, p. 222, pl. 1, figs. 26–28.—MILLETT, Journ. Roy. *Mic* Soc., 1898, p. 264.—BAGG, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 119.—*Hero* ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 557.—SID BOTTOM, Journ. Roy. Micr. Soc., 1918, p. 5 (?).

A reference to the original figures of this species given by Brady i the *Challenger* Report shows that evidently more than one species i included. Figure 12 strongly suggests the species described b Schlumberger as *S. inaequilateralis*, but no end view is given o Brady's plate. Figure 14 seems to belong to *Massilina.* Of th other figures 13 and 15 may be taken to represent the species *S. acu timargo.*

Brady's localities also show different faunal areas. These, as give in the *Challenger* Report, are "off Bermuda, at a depth of 435 fathom (796 meters); at four stations in the South Atlantic, 350 to 1,425 fathoms (640 to 777 meters); at three localities in the South Pacific, 15 to 255 fathoms (27 to 466 meters); it has also been found in shore sands collected on the east coast of Madagascar."

The South Pacific 15 to 255 fathoms (27 to 466 meters) and shore sands of Madagascar evidently represent a faunal area, and with no further data it would be a guess that the large specimen (fig. 15) of the *Challenger* Report came from some of these localities. This is strengthened by Heron-Allen and Earland, who remark on their specimen from the Kerimba Archipelago (p. 557):

> A very finely developed specimen at station 11, exhibiting the characteristic lacunae at the extremities of the chambers.

Egger's figures are not clear; his records are off Kerguelen, New Amsterdam; West Australia; and the Fiji Islands. Chapman records it from Funafuti. The material from western Australia Sidebottom efinitely refers to *Challenger* figures 12 and 13. Millett gives no gure and simply says: "A few small specimens from both areas" Malay Archipelago).

With this more or less indefinite recording and the fact that the pecimens from about the British Isles do not seem related to the do-Pacific material it would seem that there quite likely may be eral species now going under this name. I would limit the name those specimens of the Indo-Pacific like figure 15 of the *Challenger* eport and possibly the figure 13, which may be an earlier stage of e same.

In the Philippine material it has occurred at but one station, D5242, Pujada Bay, in 191 fathoms (350 meters).

*Spiroloculina acutimargo—Material examined.*

| Cat. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | U.S.N.M. | 1 | D5242... | ° ′ ″ ° ′ ″<br>6 51 53 N.; 126 14 10 E.. | 191 | °F.<br>64.1 | sft. gy. m.... | Rare. |

### SPIROLOCULINA TENUIMARGO Cushman.

Plate 84, fig. 3.

*Spiroloculina tenuimargo* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 32, pl. 5, figs. 2, 3.

*Description*.—Test much compressed, planospiral; chambers numerous, usually more swollen toward the basal end, inflated, nearly circular in transverse section, the apertural end somewhat produced, surface smooth; periphery of the test with a distinct, rather broad, sharp, plate-like carina, in young specimens rather even, but in older ones more or less irregular; chambers closely adjacent to one another, not separated; apertural end with a slightly produced and slightly flaring lip; aperture round.

Length slightly less than 1 mm.

This species, originally described from off Guam and off Japan, has occurred at two stations in the Philippine area—D5349, Palawan Passage, in 730 fathoms (1,335 meters), and D5445, east coast of Luzon, in 383 fathoms (699 meters).

Egger's figures of *S. acutimargo* suggest that they may be *S. tenuimargo*.

*Spiroloculina tenuimargo—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 10963 | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 29 00 E... | 730 | 40.6 | co. s......... | Rare. |
| 10964 | U.S.N.M. | 1 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s.... | Rare. |

### SPIROLOCULINA TENUISSIMA Reuss.

Plate 84, fig. 2.

*Spiroloculina tenuissima* Reuss, Sits. Akad. Wiss. Wien, vol. 55, 1867, p. 71, pl
fig. 11.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 32.

*Spiroloculina tenuis* H. B. Brady (not Czjzek), Rep. Voy. *Challenger*, Zoolo
vol. 9, 1884, p. 152, pl. 10, figs. 9, 10 (not 7, 8, 11).—Heron-Allen and Earla
Trans. Zool. Soc. London, vol. 20, 1915, p. 556.—Sidebottom, Journ. R
Micr. Soc., 1918, p. 5.

*Description.*—Test very thin, translucent, elongate, compressed, front view tapering toward either end; chambers long and narro peripheral margin broadly rounded, chambers in transverse sectio circular; apertural end produced into an elongate neck, apertu rounded, usually without distinct teeth; wall smooth.

Length usually less than 0.5 mm.

The records for this species are mostly from water of several hun dred fathoms, and the four Philippine stations range from 295 to 55 fathoms (540 to 1,012 meters). The localities are off Balayan Ba Tanon Strait; east coast of Negros; Sogod Bay, southern Leyt and east of Mindoro.

Sidebottom definitely refers one of his two varieties to the *Cha lenger* Report (pl. 10, fig. 9), which would make it this specie His material was from 465 fathoms. (850 meters), off the east coa of Australia. Chapman records it off Funafuti, in deep water.

*Spiroloculina tenuissima—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| | | | D5120... | 13 45 30 N.; 120 30 15 E... | 398 | 48.7 | gn. m., s.... | Rare. |
| 10970 | U.S.N.M. | 1 | D5190... | 10 08 15 N.; 123 16 45 E... | 295 | 63.0 | gn. m........ | Rare. |
| 10971 | U.S.N.M. | 2 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 10972 | U.S.N.M. | 1 | D5227... | 12 53 45 N.; 121 52 30 E... | 322 | ....... | gn. m........ | Rare. |

### SPIROLOCULINA MILLETTI Wiesner.

Plate 81, figs. 6, 7.

*Spiroloculina nitida* H. B. Brady (not *S. nitida* d'Orbigny), Rep. Voy. *Challenger*
Zoology, vol. 9, 1884, p. 149, pl. 9, figs. 9, 10.—Millett, Journ. Roy. Micr. Soc.,
1898, p. 265, pl. 5, figs. 9-12.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 296
pl. 41, fig. 4.—Bagg, Proc. U. S. Nat. Mus., vol. 34, 1908, p. 119.

*Spiroloculina milletti* Wiesner, Archiv. Prot., vol. 25, 1912, p. 207.—Cushman,
Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 33, pl. 5, fig. 4.

This seems to be distinct from *S. nitida*, and is very evidently a ropical species. It has occurred in the Philippine material but once, in a collection marked "Tacloban Anchorage." It is known from other ropical parts of the Pacific and elsewhere.

*Spiroloculina milletti—Material examined.*

| | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° *F.* | | |
| | U.S.N.M. | 2 | .......... | Tacloban Anchorage...... | ...... | ...... | .............. | Rare. |

## SPIROLOCULINA PLANISSIMA (Lamarck).

Plate 80, figs. 5*a*, *b*.

*Miliolites planulata*, var. *planissima* Lamarck, Anim. sans. Vert., vol. 7, 1822 p. 613, no. 4c.

*Spiroloculina planissima* Wiesner, Archiv. Prot., vol. 25, 1912, p. 209.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 556, pl. 41, figs. 1–5.

This is a fine large species, with the chambers slightly convex and mooth, the peripheral margin carinate, the apertural end extended n elliptical neck with a bifid tooth.

Length up to 2 mm. or more.

Heron-Allen and Earland had this species from the Kerimba Archipelago, off the southeastern coast of Africa. It has occurred four stations in the Philippine material, ranging in depth from 14 108 fathoms (25 to 198 meters), off Romblon; east of Masbate; ampaya Sound, Palawan Island, and off eastern Palawan.

*Spiroloculina planissima—Material examined.*

| | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne.s......... | Rare. |
| | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 50.9 | gy.s.,m...... | Rare. |
| | U.S.N.M. | 2 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy.m......... | Rare. |
| | U.S.N.M. | 1 | D5426... | 9 12 00 N.; 118 28 00 E.. | 27 | ....... | fne.gy.s..... | Few. |

## SPIROLOCULINA TENUISEPTATA H. B. Brady.

Plate 82, figs. 1–3.

*Spiroloculina tenuiseptata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 153, pl. 10, figs. 5, 6.—Millett, Journ. Roy. Micr. Soc., 1898, p. 265.—Chapman, Journ. Linn. Soc. Zoology, vol. 28, 1901, p. 172.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 5, pl. 1, fig. 7 (not figs. 5, 6).

*Description.*—"Test complanate, elongate-oval; extremities tapering, subangular, peripheral edge square or rounded. Segments numerous, narrow, arched, tubular; the successive convolutions separated by deep depressions on both sides of the test, the interspace being occupied by a thin, horizontal, shelly septum, which is sometimes wanting between the later chambers; aperture simple, circular. Length, one twenty-second inch (1.2 mm.)."

Brady's material was from off the Ki Islands, 580 fathoms (1,061 meters); off Kandavu, Fiji, 610 fathoms (1,116 meters); and the Mediterranean, 1,200 fathoms (2,200 meters). Egger records the species from off West Africa, but his figure is difficult to make out. Millett records it from the Malay Archipelago, and Chapman from the lagoon at Funafuti. Sidebottom records it from off eastern Australia, 465 fathoms (850 meters), and plate 1, figure 7, certainly seems to be this species.

In the Philippine material dredged by the *Albatross* the species has occurred in considerable numbers at D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters), and at six other stations, the depths of all ranging from 230 to 565 fathoms (420 to 1,033 meters), with the average 409 fathoms (748 meters). Bottom temperatures of six of these stations range from 40.1° F. to 52.9° F. (4.5° C. to 11.6° C.), with the average 45.7° F. (7.6° C.). The localities represented, besides the one already mentioned, are: Tawi Tawi Group, Sulu Archipelago; off northwestern Panay; east coast of Luzon; and to the southward, Sibuko Bay, Borneo, and Gulf of Boni.

My friend, Mr. Sidebottom, has sent me some specimens from the coast of Ireland which were identified by Brady as this species. They are much smaller than the Philippine specimens, less elongate, and in one beautifully sectioned specimen there is no "shelly septum" between the chambers. After seeing this material I am inclined to think that the true *S. tenuiseptata* is largely an Indo-Pacific species.

One very characteristic feature in adults is the shape of the apertural end of the chamber, which becomes free and takes a different line of growth from the rest of the chambers, and also is apt to become shorter than the half volution.

*Spiroloculina tenuiseptata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10898 | U.S.N.M. | 1 | D5162... | 5 10 00 N.; 119 47 30 E.. | 230 | 52.9 | crs. s., brk. sh. | Rare. |
| 10899 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Common. |
| 10900 | U.S.N.M. | 1 | D5238... | 7 34 45 N.; 126 38 15 E.. | 380 | 42.0 | gn. m........ | Few. |
| 10901 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob.. | Few. |
| 10902 | U.S.N.M. | 1 | D5460... | 13 32 30 N.; 123 58 06 E.. | 565 | ....... | gy. m........ | Rare. |
| 10903 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| 10904 | U.S.N.M. | 1 | D5650... | 4 58 45 N.; 121 29 00 E.. | 540 | 46.1 | gn. m........ | Rare. |
| 10905 | U.S.N.M. | 1 | H4897... | 7 46 00 N.; 122 00 00 E.. | 1,570 | ....... | gy. m., glob.. | Rare. |

### SPIROLOCULINA CIRCULARIS, new species.

Plate 80, figs. 1, 2.

*Description.*—Test circular in face view, composed of a large num- er of chambers, narrow in face view; sides concave; periphery ghtly convex, broad, last-formed chamber only projecting a little yond the general circular contour of the whole test; sutures flush th the surface, but of clear shell material making them stand out darker lines; apertural end with a broad, low aperture, the edges ng slightly thickened and with a low tooth; surface smooth and lished.

Diameter up to 1.5 mm.

*Distribution.*—Type specimen (Cat. No. 10897, U.S.N.M.) from *atross* station D5259, off northwestern Panay, in 312 fathoms (571 ters), bottom temperature 49.3° F. (9.6° C.).

This is a beautiful species frequent at this station. Its circular ape, concave sides, broad periphery, sutures forming a series of ncentric circles with the two zigzag lines when the chambers meet; ry broad low chambers and aperture, and the surface smooth and polished, should easily distinguish this species. It was found no- where else in the region, yet is frequent in the material from this one tation.

*Spiroloculina circularis—Material examined.*

| & l. | Coll. of— | No. of speci- mens. | Station. | Locality. | Depth in fath- oms. | Bot- tom tem- pera- ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  | U.S.N.M. | 4 | D5259... | ° ′ ″ ° ′ ″<br>11 57 30 N.; 121 42 15 E.. | 312 | ° F.<br>49.3 | gy.m., glob.. | Frequent. |

### SPIROLOCULINA ORBIS, new species.

Plate 83, fig. 3.

*Description.*—Test subcircular in front view, thick, the periphery quarely truncate; chambers rather few; sides flat, except near the periphery, when there is a slight thickening; ends of the final chamber lightly extended, apertural end with a short neck and rounded perture with a very slight collar-like lip; surface smooth but dull.

Length usually less than 1 mm.

*Distribution.*—Type specimen (Cat. No. 10951, U.S.N.M.) from *Albatross* station D5178, off Romblon, in 78 fathoms (143 meters), where it is frequent. The specimens show very little variation of any sort. It was also found in material from D5179, off Romblon, in 37 fathoms (68 meters); D5269, Verde Island Passage, in 220 fathoms (403 meters); and D5277, China Sea, off southern Luzon, in 80 fathoms (146 meters).

*Spiroloculina orbis—Material examined.*

| Cat. No | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abund |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10961 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Freque |
| 10962 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Rare. |
| 10963 | U.S.N.M. | 1 | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p..... | Rare. |
| 10964 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Few. |

### SPIROLOCULINA ROBUSTA H. B. Brady.

Plate 79, figs. 2*a*, *b*.

*Spiroloculina robusta* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1 p. 150, pl. 9, figs. 7, 8.—FLINT, Rep. U. S. Nat. Mus., 1897 (1899), p. pl. 42, figs. 1, 2.—CHAPMAN, Journ. Linn. Soc., Zoology, vol. 28, 1901, p. vol. 30, 1910, p. 396.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p.

This is another species with a peculiar distribution so far as av able records show. Brady described it from off Culebra Isla West Indies, in 390 fathoms (713 meters), and Flint records it fr the Gulf of Mexico, 200 to 1,200 fathoms (366 to 8,366 meter Chapman records it from off Funafuti in 200 and 1,485 fathom (366 and 2,716 meters), in the lagoon, one specimen in 7½ fathom (13.5 meters); and I have had it from the Western Pacific in 8 and 1,040 fathoms (11,476 and 1,902 meters). In the *Albatr* Philippine Expedition it was dredged at station D5650, in the G of Boni, in 540 fathoms (988 meters).

*Spiroloculina robusta—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abund |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10950 | U.S.N.M. | 4 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m....... | Frequent |

### SPIROLOCULINA VALIDUS, new species.

Plate 79, figs. 3*a*, *b*.

*Description.*—Test large, composed of but few chambers, su circular or broadly elliptical in front view; periphery broadly roun ed, inner portion depressed, apertural portion extended into a defini cylindrical or slightly tapering neck; aperture circular, surface wit out ornamentation, slightly granular, dull.

Length up to 2.5 mm.

*Distribution.*—Type specimen (Cat. No. 10973, U. S. N. M.) fro ***Albatross*** station D5668, Macassar Strait, in 901 fathoms (1,64 meters). It also occurred at six other stations, ranging in dept rom 162 to 901 fathoms (297 to 1,648 meters), the average about 98 fathoms (911 meters). Bottom temperatures of three stations nge from 38.2° F. to 55.8° F. (3.4° to 13.2° C.), with the average mperature 45° F. (7.2° C.). Other localities are east coast of zon; Darvel Bay and Sibuko Bay, Borneo; and off Bouro Island.

This species is close to *S. robusta* H. B. Brady, from which it dif s mainly in the apertural form and characters. It may be that material referred to *S. robusta* in the Indo-Pacific should belong . *validus*, and Brady's name be used only for the Atlantic material. tudy of this will later be made to see if this may not be the fact.

*Spiroloculina validus—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 5 | D5446... | 12 43 51 N.; 124 59 18 E... | 300 | ....... | gn. m....... | Frequent. |
| U.S.N.M. | 3 | D5460... | 13 32 30 N.; 123 58 06 E... | 565 | ....... | gy. m....... | Frequent. |
| U.S.N.M. | 2 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Rare. |
| U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |
| U.S.N.M. | 1 | D5585... | 4 07 00 N.; 118 49 54 E... | 476 | 41.1 | gy. m....... | Rare. |
| U.S.N.M. | 3 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m....... | Few. |
| U.S.N.M. | 6 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Common. |

## SPIROLOCULINA COSTIFERA Cushman.

Plate 79, figs. 1*a*, *b*.

*Spiroloculina costifera* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 34, pl. 6, figs. 1-3.

In the North Pacific this species was recorded from off Midway d the Hawaiian Islands. The only Philippine material is from *batross* station D5236, Pacific Ocean, off Mindanao, in 494 fathoms, 03 meters). A single specimen here is referred to this species, though the following variety is common.

*Spiroloculina costifera—Material examined.*

| Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|
| | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |

## SPIROLOCULINA COSTIFERA Cushman, var. PLENA, new variety.

Plate 82, figs. 5-7.

*Description.*—Variety differing from the typical in the smooth walls, but with the same rounded form of chambers, excavate on the inner margins, and very rounded periphery.

*Distribution.*—Type specimen (Cat. No. 10980, U.S.N.M.) from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, i 494 fathoms (903 meters), where the variety is very common.

In this variety the whole chamber is rounded, without the costa of the typical form. In adult specimens the chambers decreas in length and fail to make up the entire half volution as in th typical.

*Spiroloculina costifera, var. plena—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abunda |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10980<br>10981 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common |

### SPIROLOCULINA SCROBICULATA, new species.

Plate 81, figs. 1*a*, *b*.

*Description.*—Test elliptical in face view, composed of numero chambers, each circular in transverse section, sutures deep; *apertur* end continued into an elongate cylindrical neck with a slight everte lip; surface peculiarly scrobiculate almost irregularly reticulat with very fine markings, with low magnification appearing simp granular.

Length up to 1.25 mm.

*Distribution.*—Type specimen (Cat. No. 10944, U. S. N. M.) fro *Albatross* station D5181, off eastern Panay, in 26 fathoms (48 meter It has also occurred at D5342, Malampaya Sound, Palawan, in 14 25 fathoms (25 to 46 meters).

This is a very peculiarly ornamented species, and should looked for elsewhere in shallow water of the Indo-Pacific regio

*Spiroloculina scrobiculata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10944 | U.S.N.M. | 3 | D5181... | 11 36 40 N.; 123 35 35 E.. | 26 | ....... | m., fne. s.... | Few. |
| 10945 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m....... | Few. |

### SPIROLOCULINA ELEGANS Cushman.

Plate 80, figs. 4*a*, *b*.

*Spiroloculina elegans* Cushman, Carnegie Inst., Dept. of Marine Biology, vol. 1918, p. 290, pl. 96, figs. 1*a*, 1*b*, 2.

*Description.*—Test one and a half as long as wide, much compresse peripheral margin broadly rounded, apertural end somewhat exserte ounded; sutures distinctly depressed, wall ornamented with a regular attern of elliptical depressions, arranged in rows longitudinally, he depressions of each row alternating regularly with those of the djacent rows.

Length up to 1 mm. or slightly more.

The species was described from Murray Island, on the Great arrier Reef of Australia, from shallow water. Its nearest relative ms to be *S. foveolata* Egger, from which it differs very much in pe and general appearance.

It was found in few numbers at five stations in 19 to 318 fathoms 5 to 582 meters); bottom temperature at the only station given, .1° F. (17.2° C.).

*Spiroloculina elegans—Material examined.*

| [illegible] | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh.... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5217... | 13 20 00 N.; 123 14 15 E.. | 105 | 63.1 | crs. gy. s.... | Rare. |
| [illegible] | U.S.N.M. | 1 | .......... | Tacloban Anchorage, P. I. | ....... | ....... | .............. | Rare. |

### SPIROLOCULINA ANTILLARUM d'Orbigny.

Plate 81, figs. 4*a*, *b*; plate 83, fig. 4.?

*Spiroloculina antillarum* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat. Cuba, "Foraminifères," 1839, p. 166, pl. 9, figs. 3, 4.—(?) H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 155, pl. 10, figs. 21, *a*, *b*.

*Spiroloculina grata* TERQUEM (?) and late authors.

A study of shallow-water West Indian material and comparison ith d'Orbigny's figures show that our common typical species so haracteristic of coral-reef regions should have the name *S. antillarum* d'Orbigny.

A comparison of the two references given by Brady in the *Challenger* Report shows that of the two, d'Orbigny's figure is more characteristic, not only of most of our coral-reef material, but actually nearer the *S. grata* as figured by Brady. On the other hand, Brady refers to *S. antillea* and figures a specimen which only remotely suggests the original of d'Orbigny. This specimen was from 350 fathoms (640 meters) off the coast of Brazil, while d'Orbigny's original was from "shore sands." The West Indian material which I collected in Jamaica shows clearly that the common shallow-water species of those waters is identical with the species figured and named by d'Orbigny *S. antillarum*. The species seems to be very widely distributed in the tropics, and even allowing that Terquem's Pliocene specimen from the Isle of Rhodes is the same, d'Orbigny's name should have priority. It is one of the most unfortunate choices o Brady, made in the *Challenger* Report, which has been blindl followed by later writers.

As elsewhere in the tropics this species is common in the Phili pines, especially in shallow water. The stations range in depth fro 10 to 305 fathoms (18 to 558 meters), the average being close to fathoms (165 meters). It is most common at the shallower-wa stations. It is most frequent in the southern part of the Arch pelago about the shores of the Sulu Sea and occurs at one station Sibuko Bay, Borneo.

*Spiroloculina antillarum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundan |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10982 | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co.......... | Few. |
| 10983 | U.S.N.M. | 1 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh........ | Few. |
| 10984 | U.S.N.M. | 2 | D5145... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh.... | Few. |
| 10985 | U.S.N.M. | 1 | D5146... | 5 46 40 N.; 120 48 50 E.. | 24 | ....... | co. s., sh.... | Few. |
| 10986 | U.S.N.M. | 3 | D5154 .. | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s......... | Few. |
| 10987 | U.S.N.M. | 10 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Common. |
| 10988 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s........ | Common. |
| 10989 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Few. |
| 10990 | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Few. |
| 10991 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Few. |
| 10992 | U.S.N.M. | 2 | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 43.3 | gn. m....... | Few. |
| 10993 | U.S.N.M. | 2 | .......... | Jolo Jolo, P. I............ | ...... | ....... | .............. | Few. |

### SPIROLOCULINA ANTILLARUM d'Orbigny, var. ANGULATA Cushman.

Plate 81, figs. 5*a*, *b*.

*Spiroloculina grata* H. B. BRADY (part), Rep. Voy. *Challenger*, Zoology, vol. 1884, pl. 10, figs. 22, 23.

*Spiroloculina nitida* (striate variety) MILLETT, Journ. Roy. Micr. Soc., 1898, p 266.

*Spiroloculina grata*, var. *angulata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 1917, p. 36, pl. 7, fig. 5.

This variety differs from the typical form in having the chambers angular instead of circular in transverse section, and the costa parallel to the peripheral margin of the chamber instead of oblique in extreme forms with the periphery carinate.

The type specimen of the variety is from Cebu, Philippines. It was noted at two other stations—D5160, in 12 fathoms (22 meters), Tawi Tawi Group, Sulu Archipelago, and D5218, in 20 fathoms (37 meters), between Burias and Luzon.

It is widely distributed and with the typical is found in shallow, tropical waters.

*Spiroloculina artillarum*, var. *angulata*.—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 94 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............ | Few. |
| 95 | U.S.N.M. | 2 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Few. |

### SPIROLOCULINA (?) CONVEXIUSCULA H. B. Brady.

Plate 82, figs. 4*a*, *b*.

*Spiroloculina* (?) *convexiuscula* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 155, pl. 10, figs. 18-20.—MILLETT, Journ. Roy. Micr. Soc., 1898, p. 266.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 6.

*Description.*—Test small, compressed, nearly circular in side view, biconvex; early chambers obscured, the later chambers overlapping nearly to the center; chambers ornamented by longitudinal, rounded, more or less interrupted costae; peripheral margin carinate; aperture with a definite lip, rounded or elliptical.

Length usually less than 1 mm.

Brady's material was from two stations—off Raine Island, Torres Strait, 155 fathoms (283 meters), and off the Admiralty Islands, 16 to 25 fathoms (29 to 46 meters). Millett records it from the Malay Archipelago, "common and widespread over area 1 (eastern part), but rare in area 2 (west of Borneo)." Sidebottom mentions "a single specimen, which, appears to be typical," from 465 fathoms (850 meters), east coast of Australia.

Millett remarks as follows on this species:

> Assigned by Brady, with some hesitation, to this genus, it is more probably an arrested form of *Articulina*. It is remarkable for its uniformity, specimens from all localities being almost identical in size and structure.

The aperture and embracing characters would seem to place this species with *Vertebralina*, but other characters suggest that it be left for the present under *Spiroloculina*.

In the Philippine material it has occurred at eight stations, common at two of them. The depths range from 10 to 393 fathoms (18 to 719 meters), with the average 76 fathoms (139 meters). The two bottom temperatures given are 75.7° F. (24.2° C.) and 43.7° F. (6.5° C.). The stations are: China Sea off southern Luzon; Jolo Jolo, Tawi Tawi Group; off Romblon and off eastern Panay.

It is very evidently a species of warm, shallow waters of the Indo-Pacific region.

*Spiroloculina (?) convexiuscula*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10885 | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E... | 10 | ....... | Co.......... | Few. |
| 10886 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 398 | 43.7 | gn. m., s.... | Few. |
| 10887 | U.S.N.M. | 2 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Few. |
| 10888 | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Few. |
| 10889 | U.S.N.M. | 10+ | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s....... | Common. |
| 10890 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Rare. |
| 10891 | U.S.N.M. | 4 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Common. |
| 10892 | U.S.N.M. | 2 | .......... | Jolo Jolo, P. I............... | ....... | ....... | ............... | Rare. |

### SPIROLOCULINA ADVENA, new species.

Plate 83, figs. 1*a*–*c*.

*Description.*—Test inequilateral, one side nearly flat or slightly convex, the other deeply excavate in the middle, but with a high raised portion near the middle running lengthwise of the chamber, peripheral portion again flattened; whole test elliptical, the ends somewhat produced, apertural end slightly extended, aperture small, rounded; sutures distinct, wall smooth.

Length about 1 mm.

*Distribution.*—Type specimen (Cat. No. 10949, U. S. N. M.) from *Albatross* station D5178, off Romblon, in 78 fathoms (143 meters).

This would have been taken for some sort of abnormal specimen if found alone, but it occurs in the same form at this station in other specimens. It was never found elsewhere, however. Its nearest relative seems to be *S. affixa* Terquem.

*Spiroloculina advena*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10949 | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |

### SPIROLOCULINA AFFIXA Terquem.

Plate 83, figs. 2*a*–*c*.

*Spiroloculina affixa* TERQUEM, Mém. Soc. géol. France, ser. 3, vol. 1, 1878, p. 55, pl. 5 (10), figs. 13*a*–*c*.—HOWCHIN, Trans. Roy. Soc. South Australia, vol. 12, 1889, p. 2.—CHAPMAN, Journ. Linn. Soc. Zoology, vol. 30, 1907, p. 16, pl. 1, figs. 23–25.

*Spiroloculina inaequilateralis* SCHLUMBERGER, Mém. Soc. Zool. France, vol. 6, 1893, p. 201, pl. 4, figs. 84–86; fig. 3 (in text).—SIDEBOTTOM, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 54, No. 16, 1910, p. 2, pl. 1, fig. 2.

*Spiroloculina acutimargo* H. B. BRADY (in part), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, pl. 10, fig. 12 (not figs. 13–15).

*Description.*—Test elongate, fusiform, the sides very different from one another, one side flattened, the other deeply concave; chambers with definite sutures which are flush with the surface; wall thin and smooth; peripheral face somewhat concave, peripheral margin somewhat carinate, apertural end subacute; aperture elliptical, compressed.

Length from 0.5 to 0.75 mm.

The distribution of this species includes two areas so far as is known—the Mediterranean, represented by the types which Terquem described, from the Pliocene of the Isle of Rhodes, and the recent specimens from the Gulf of Marseilles (Schlumberger) and the Bay of Palermo, Sicily (Sidebottom); the other the Pacific region. Here Howchin and Chapman have found the species in the Tertiary of Australia, and I have it in the recent material from the Philippines and from off New Zealand.

The Philippine specimens are from four *Albatross* stations off northern Cebu, 32 fathoms (59 meters); off southeastern Mindoro, 145 fathoms (265 meters); and China Sea, off Formosa, 148 and 340 fathoms (271 and 622 meters). The most typical specimens are those off New Zealand.

*Spiroloculina affixa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10693 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Rare. |
| 10694 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m......... | Rare. |
| 10695 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh......... | Rare. |
| 10696 | U.S.N.M. | 1 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Oo.... | Rare. |

### SPIROLOCULINA ARENARIA H. B. Brady.

Plate 81, figs. 3*a*, *b*.

*Spiroloculina arenaria* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 153, pl. 8, fig. 12.—EGGER, Abh. kön. Bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 226, pl. 1, fig. 29.—DAKIN, Ceylon Pearl-Oyster Fisheries, Suppl. Rept., pt. 5, 1906.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 36.

One of Brady's *Challenger* stations for this species was in the Philippines in 95 fathoms (174 meters). The others are off Kandavu, Fiji Islands, 210 fathoms (384 meters), and off Raine Island, Torres Strait, 155 fathoms (283 meters). Dakin records it off Ceylon. Egger's records are off Mauritius and off western Australia.

In the Philippines species have occurred at five stations ranging in depth from 80 to 248 fathoms (146 to 454 meters), bottom temperatures from 47.4° F. to 59° F. (8.5° C. to 15° C.). The localities are: China Sea, off southern Luzon; off western Bohol; and east of Masbate.

This is another species known only from the Philippines and the Indo-Pacific.

*Spiroloculina arenaria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10996 | U.S.N.M. | 10+ | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m... | Common. |
| | | | D5192... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gy. m....... | Rare. |
| | | | D5213... | 12 15 00 N.; 123 57 30 E.. | 80 | ....... | s., m., sh.... | Few. |
| | | | D5218... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s.... | Rare. |
| | | | D5282... | 13 53 00 N.; 120 26 45 E.. | 348 | 47.4 | dk. gy. s.... | Few. |

## Genus PLANISPIRINA Seguenza, 1880.

### PLANISPIRINA CONTRARIA (d'Orbigny).

Plate 85, figs. 1*a*, *b*.

*Biloculina contraria* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 266, *pl.* 16, figs. 4–6.

*Planispirina contraria* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 195, pl. 11, figs. 10, 11, woodcut, figs. 5, *a*.—MILLETT, Journ. Roy. Micr. Soc., 1898, p. 611, pl. 13, fig. 12.

This species was not found in the material from the North Pacific which I examined, yet it has been found in the Philippine material at 20 stations and in considerable numbers at some of them. The specimens are large and well developed.

The localities represented are Pacific Ocean, east and north coasts of Mindanao; off northwestern Panay; east and west coasts of Luzon; between Negros and Siquijor; between Jolo and Tawi Tawi. To the southward it has occurred in Darvel Bay and Sibuko Bay, Borneo; south of Patiente Strait and the Gulf of Boni.

Depths of the stations range from 243 to 890 fathoms (445 to 1,628 meters), the average 445 fathoms (814 meters). The bottom temperatures of 11 stations range from 38.3° F. to 53.5° F. (3.5° C. to 11.8° C.) with the average 45.7° F. (7.6° C.).

The distribution of this species is peculiar. Millett had but a single specimen in the Malay Archipelago, and it does not seem to extend into the southern or eastern Pacific to any extent from the records. Brady records it from *Challenger* material, north of New Guinea, 1,075 fathoms (1,966 meters), and off Amboina, 1,425 fathoms (2,607 meters). The record from off Chile is in doubt, and the others are from the North Atlantic.

*Planispirina contraria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10768 | U.S.N.M. | 3 | D5115... | 13 37 11 N.; 120 43 40 E... | 340 | ....... | ............... | Few. |
| 10769 | U.S.N.M. | 1 | D5136... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 10770 | U.S.N.M. | 6 | D5459... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Common. |
| 10771 | U.S.N.M. | 3 | D5428... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m....... | Few. |
| 10772 | U.S.N.M. | 5 | D5460... | 13 22 30 N.; 123 58 06 E... | 565 | ....... | gy. m....... | Common. |
| 10773 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 30 E... | 500 | ....... | gy. m....... | Rare. |
| 10774 | U.S.N.M. | 5 | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Common. |
| 10775 | U.S.N.M. | 3 | D5469... | 13 36 48 N.; 123 33 24 E... | 500 | ....... | gn. m....... | Few. |
| 10776 | U.S.N.M. | 1 | D5470... | 13 37 30 N.; 123 41 00 E... | 560 | ....... | m........... | Few. |
| 10777 | U.S.N.M. | 1 | D5523... | 8 48 44 N.; 123 27 35 E... | ....... | ....... | ............... | Few. |
| 10778 | U.S.N.M. | 3 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m....... | Few. |
| 10779 | U.S.N.M. | 1 | D5565... | 5 51 42 N.; 120 30 30 E... | 243 | 52.3 | s., ptr. sh... | Few. |
| 10780 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| 10781 | U.S.N.M. | 4 | D5582... | 4 19 54 N.; 118 58 28 E... | 890 | 38.3 | gy. m., fne. s | Common. |
| 10782 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 06 E... | 260 | 45.7 | fne. gy. s.... | Few. |
| 10783 | U.S.N.M. | 1 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Rare. |
| 10784 | U.S.N.M. | 1 | D5591... | 4 11 48 N.; 118 38 20 E... | 260 | ....... | ............... | Rare. |
| 10785 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m..... | Rare. |
| 10786 | U.S.N.M. | 1 | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | ............... | Rare. |
| 10787 | U.S.N.M. | 1 | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m....... | Rare. |

### PLANISPIRINA cf. STRIATA Sidebottom.

*Planispirina striata* SIDEBOTTOM, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 48, No. 5, 1904, p. 21, pl. 5, figs. 12–14, text figure 9.

Material resembling this species described by Sidebottom from off Delos in the Grecian Archipelago occurred at *Albatross* station D5218, between Burias and Luzon, in 20 fathoms (37 meters).

*Planispirina cf. striata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 10808 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Rare. |

### PLANISPIRINA SPHAERA (d'Orbigny).

*Biloculina sphaera* D'ORBIGNY, Voy. Amér. Mérid., 1839, "Foraminifères," p. 66, pl. 8, figs. 13–16.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 141, pl. 2, figs. 4*a*, *b*.

*Planispirina sphaera* SCHLUMBERGER, Mém. Soc. Zool. France, 1891, p. 190, text figs. 45, 46.—CHAPMAN, Journ. Linn. Soc. Zoology, vol. 30, 1910, p. 399.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 37, pl. 19, fig. 1.

This is a widely-distributed species especially found in deep water. Specimens were rare at three stations—D5428, off eastern Palawan, in 1,105 fathoms (2,021 meters); D5470, east coast of Luzon, 560 fathoms (1,024 meters); and D5668, Macassar Strait, 901 fathoms (1,648 meters). Chapman records it from off Funafuti in 1,050 fathoms (1,920 meters).

*Planispirina sphaera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13589 | U.S.N.M. | 1 | D5428... | 9 13 00 N.; 118 51 15 E... | 1,105 | 49.7 | gy. m....... | Rare. |
| 13588 | U.S.N.M. | 1 | D5470... | 13 37 30 N.; 123 41 00 E... | 560 | ....... | m............ | Rare. |
| 13590 | U.S.N.M. | 1 | D5668... | 2 28 15 S.; 118 49 00 E... | 901 | 38.2 | gy. m....... | Rare. |

## Genus VERTEBRALINA d'Orbigny, 1826.

### VERTEBRALINA STRIATA d'Orbigny.

*Vertebralina striata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 283, No. 1; Modéles, 1826, No. 81.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 187, pl. 12, figs. 14–16.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 38, pl. 22, figs. 3, 4.

This is a species characteristic of coral-reef conditions. Millett did not find it well developed in his material from the Malay Archipelago, but I found it fairly common in material from about the Hawaiian Islands.

The only Philippine record is a single specimen in shore material from Tataan Island. It is typical.

*Vertebralina striata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° F. | | |
| 13581 | U.S.N.M. | 1 | .......... | Tataan Island, P. I........ | ...... | ...... | ............... | Rare. |

### VERTEBRALINA STRIATA d'Orbigny, var. RETICULOSA, new variety.

Plate 97, fig. 4.

*Description.*—Variety differing from the typical in the ornamentation of the last few chambers, which, instead of being "the invariable surface ornament of delicate parallel striae," as in the typical, has certain of the lines stronger than others in usually alternating areas, giving a very peculiar reticulose appearance.

This variety occurs in the Mediterranean, where it is noted by Sidebottom from Delos " * * * some of them boldly striated and pitted as in *V. insignis*." [37] I am grateful to Mr. Sidebottom for Delos material in which this variety occurs. Heron-Allen and Earland[38] also note under *V. striata*, "at Stns. 10 and ? B specimens with a reticulate instead of a striate surface were observed." The variety, therefore, has a wide distribution in warm waters.

The type (U.S.N.M. No. 13591) is from *Albatross* station D5160, Sulu Archipelago, Tawi Tawi Group, 12 fathoms (22 meters). This is figured here and, while not so definitely reticulose as the Mediterranean specimens, has carried the peculiar ornamentation still further in its development.

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[37] Mem. Proc. Manchester Lit. and Philos. Soc., vol. 48, 1904, No. 5, p. 18.

[38] Trans. Zool. Soc. London, vol. 20, 1915, p. 557.

*Vertebralina striata*, var. *reticulosa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 1391 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............ | Rare. |

## Genus NODOBACULARIA Rhumbler, 1895.

### NODOBACULARIA TIBIA Jones and Parker.

Plate 85, figs. 2, 3.

*Nodobacularia tibia* JONES and PARKER, Quart. Journ. Geol. Soc., vol. 16, 1860, p. 455, pl. 20, figs. 48–51.—H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 52, pl. 8, figs. 1, 2; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 135, pl. 1, figs. 1–4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 39, pl. 8, figs. 1, 2.

There are two sorts of specimens in the material, one of these evidently the megalospheric form, in which the proloculum is large and followed by a long, straight chamber, sometimes constricted ones. The other is evidently the microspheric form, the proloculum and initial end usually wanting, and represented by a series of gradually enlarging subcylindrical chambers.

Brady records this species from 95 fathoms (174 meters) from the Philippines in the *Challenger* material.

The only material I have had has come from the following stations: D5201, Sogod Bay, southern Leyte, in 554 fathoms (1,012 meters), and D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (1,086 meters).

*Nodobacularia tibia*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| | | | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | |
| | | | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | |

### Subfamily QUINQUELOCULININÆ.

## Genus QUINQUELOCULINA d'Orbigny, 1826.

This genus contains probably more specimens of various species than any other in the entire Philippine foraminifera. The species are numerous and many of them very definite, both in their characters and their geographical distribution.

They seem to fall into three different groups: First, those which occur in the deeper water and which are found in other regions and represent widely distributed species. These are usually few in number, as far as specimens occur, and are widely scattered in the region where sufficient depth is obtained, especially on the ocean side of the islands, and in the region southward where the *Albatross* dredged. The second group of species is that represented by Indo-Pacific species, which occur characteristically in the South Pacific, about Australia, northward to southern Japan, westward to the Hawaiian Islands, and usually eastward through the Indian Ocean to the coast of Africa. Such species are often widely distributed in shallow water, often occurring in great numbers. The third group are those which seem to be characteristic of this region, and may either represent local species or more widely spread species which have not been recorded elsewhere. These include some of the largest and most characteristic species of the region.

### QUINQUELOCULINA SEMINULUM (Linnaeus).

Plate 88, figs. 4*a*–*c*.

*Serpula seminulum* LINNAEUS, Syst. Nat., ed. 12, 1767, p. 1264, No. 791.

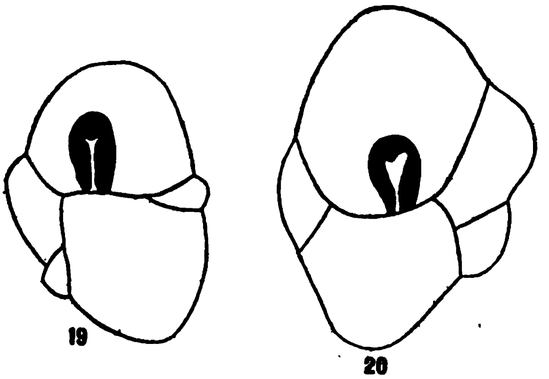
*Quinqueloculina seminulum* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 303, No. 44.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 44, pl. 11, fig. 2, fig. 29 (in text).

*Miliolina seminulum* WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 85, pl. 7, figs. 183–185.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 157, pl. 5, figs. 6*a*–*c*.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, 1915, vol. 20, p. 569, pl. 42, fig. 31.

There are numerous specimens which can be referred to this species, but they are not common at any station, and are found, as a rule, in the region of the Sulu Sea.

Specimens have occurred at 13 stations, ranging in depth from 18 to 159 fathoms (35 to 291 meters), the average depth being 40 fathoms (73 meters). These localities represent the following: China Sea, off southern Luzon; Sulu Sea, off western Mindanao; near Basilian Island; off Jolo; and off Tawi Tawi.

It has also occurred rarely off northern Cebu and in Buton Strait.



FIGS. 19, 20.—QUINQUELOCULINA SEMINULUM (LINNAEUS). × 20. FROM ALBATROSS STATION D5152. 19, SPECIMEN WITH THE TIP OF THE TOOTH BECOMING BIFID. 20, SPECIMEN WITH THE TOOTH FORKED AND MUCH BROADENED TOWARD THE TIP.

Specimens are referred to this species from almost all parts of the world, and, being smooth and with few distinguishing characters, many species or varieties have been placed under this name. Heron-Allen and Earland record it from the Kerimba Archipelago, where, according to them, it shows a great amount of variation. The largest specimens from the Philippine region, when fully grown, measure

3 mm. in length, are smooth, with a glossy surface, and are slightly angled.

*Quinqueloculina seminulum*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ″ | | ° *F.* | | |
| [illegible] | U.S.N.M. | 1 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m. .. | Few. |
| [illegible] | U.S.N.M. | 1 | D5132... | Island off Panabutan Point, N. 15°; W., 0.3 mile. | 36 | ....... | gn. m., s.... | Rare. |
| [illegible] | U.S.N.M. | 3 | D5133... | Island off Panabutan Point, N. 52°; E., 1.5 miles. | 38 | 79.5 | gn. m., s.... | Few. |
| [illegible] | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Few. |
| [illegible] | U.S.N.M. | 1 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh........ | Rare. |
| [illegible] | U.S.N.M. | 4 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s......... | Few. |
| [illegible] | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Rare. |
| [illegible] | U.S.N.M. | 1 | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m........ | Rare. |
| [illegible] | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Rare. |
| [illegible] | U.S.N.M. | 4 | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy. m........ | Rare. |
| 11631 | U.S.N.M. | 1 | .......... | Cebu.................. | ...... | ....... | .............. | Rare. |
| 12081 | U.S.N.M. | 1 | .......... | Cebu.................. | ...... | ....... | .............. | Rare. |

## QUINQUELOCULINA VULGARIS d'Orbigny.

Plate 87, figs. 1*a*–*c*.

*Quinqueloculina vulgaris* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 33.—SCHLUMBERGER, Mém. Soc. Zool. France, 1893, p. 207, text figs. 13, 14, pl. 2, figs. 65, 66.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 46, pl. 11, fig. 3.

*Miliolina vulgaris* CHAPMAN, Trans. New Zealand Inst., vol. 38, 1905, p. 81.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 569.

This species, which is now known from this general region, from the Hawaiian Isalnds, south to New Zealand, and westward to the Kerimba Archipelago off southeastern Africa, has been found to be a common species in the Philippine region. Specimens have occurred at 35 stations, ranging in depth from 10 to 805 fathoms (18 to 1,472 meters), the average depth being 236 fathoms (432 meters). Bottom temperatures are given at 18 stations, ranging from 43.7° F. to 79.5° F. (6.5° C. to 26. 3° C.), the average depth being 53.9° F. (12.1° C.). There does not seem to be any particular depth at which it is particularly abundant.

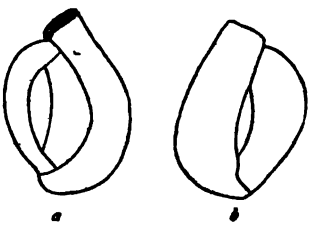


FIG. 21.—QUINQUELOCULINA VULGARIS D'ORBIGNY. × 50. FROM ALBATROSS STATION D5216. OPPOSITE SIDES OF SAME SPECIMEN.

There is no great variation in its general characters, and on the whole it forms a fairly well-defined species in the material. Most of the stations are in the Archipelago itself, but there are a few in the deeper water in the regions to the south. It has been rare at the stations in the southern area where it is found.

The localities in the Archipelago are as follows: Tara Island; China Sea, off southern Luzon; Balayan Bay; Sulu Sea, off western Mindanao; off eastern Panay; between Panay and Negros; off northern Cebu; Sogod Bay, southern Leyte; off western Samar; east o Masbate; between Bohol and Leyte; Pacific Ocean, east coast of Mindanao; off northeastern Mindoro; Verde Island Passage; Malampay Sound, Palawan Island; Palawan Passage; between Samar and Leyte off northern Mindanao; between Siquijor and Bohol Islands; north o Tawi Tawi; and to the southward in Darvel Bay, Borneo; Gulf o Tomini, Celebes; and south of Patiente Strait.

*Quinqueloculina vulgaris—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13636 | U.S.N.M. | 2 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s., sh. | Rare. |
| 13640 | U.S.N.M. | 4 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s........ | Few. |
| 13641 | U.S.N.M. | 1 | D5109... | 14 08 45 N.; 120 16 30 E... | 10 | ....... | Co........... | Rare. |
| 13659 | U.S.N.M. | 1 | D5120... | 13 45 30 N.; 120 30 15 E... | 383 | 43.7 | gn. m., s.... | Rare. |
| 13643 | U.S.N.M. | 10 | D5133... | Island off Panabutan Point, N. 52°; E., 1.5 miles. | 38 | 79.5 | gn. m., s.... | Common. |
| 13645 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 13644 | U.S.N.M. | 1 | D5182... | 11 30 40 N.; 123 23 20 E... | 24 | ....... | fne. s., m.... | Rare. |
| 13646 | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E... | 638 | 49.8 | gn. m....... | Rare. |
| 13648 | U.S.N.M. | 6 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Common. |
| 13649 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 13647 | U.S.N.M. | 5 | D5206... | 11 31 40 N.; 124 42 40 E... | 32 | ....... | gn. m....... | Few. |
| 13650 | U.S.N.M. | 1 | D5213... | 12 15 00 N.; 123 57 30 E... | 80 | ....... | s., m., sh.... | Rare. |
| 13651 | U.S.N.M. | 4 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m....... | Few. |
| 13652 | U.S.N.M. | 1 | D5230... | 10 01 50 N.; 124 42 30 E... | 118 | 57.6 | gy. s........ | Rare. |
| 13655 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 56 52 E... | 494 | 41.2 | fne. gy. s.... | Rare. |
| 13653 | U.S.N.M. | 2 | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s.... | Rare. |
| 13637 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Common. |
| 13638 | U.S.N.M. | 2 | D5269... | 13 39 50 N.; 120 59 30 E... | 220 | ....... | fne. s., p.... | Rare. |
| 13639 | U.S.N.M. | 3 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 50.6 | fne. s., m., sh | Few. |
| 13642 | U.S.N.M. | 5 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Few. |
| 13660 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-26 | ....... | gy. m....... | Rare. |
| 13661 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s....... | Rare. |
| 13662 | U.S.N.M. | 4 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Few. |
| 13663 | U.S.N.M. | 1 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s | Rare. |
| 13664 | U.S.N.M. | 2 | D5526... | 9 12 45 N.; 123 45 30 E... | 805 | 52.3 | gn. m., glob. | Rare. |
| 13665 | U.S.N.M. | 10+ | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53 | gy. m., glob. | Common. |
| 13666 | U.S.N.M. | 1 | D5572... | 5 31 36 N.; 120 09 45 E... | 334 | 52.3 | s............. | Rare. |
| 13668 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E... | 315 | 52.3 | Co., s....... | Rare. |
| 13669 | U.S.N.M. | 2 | D5576... | 5 25 56 N.; 120 05 39 E... | 277 | 53.3 | s............. | Rare. |
| 13667 | U.S.N.M. | 2 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co... | Rare. |
| 13654 | U.S.N.M. | 3 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co.... | Rare. |
| 13656 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 05 E... | 765 | ....... | s., glob., ptr. | Rare. |
| 13657 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | .............. | Rare. |
| 13658 | U.S.N.M. | 3 | D5630... | 0 56 30 S.; 128 05 00 E.. | 569 | ....... | Co., s., m... | Rare. |
| 13670 | U.S.N.M. | 2 | .......... | Tara Island, P. I........... | ...... | ....... | .............. | Rare. |

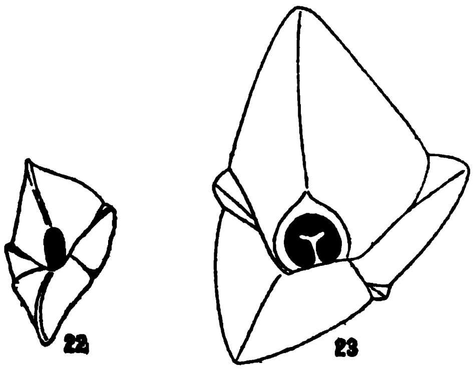
### QUINQUELOCULINA LAMARCKIANA d'Orbigny.

Plate 87, figs. 2, 3*a–c*.

*Quinqueloculina lamarckiana* d'Orbigny, in De La Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 189, pl. 11, figs. 14, 15.

This species seems to be very common in the region, occurring at 1 stations, ranging in depth from 12 to 1,560 fathoms (22 to 2,853 meters), the average being 215 fathoms (393 meters). Bottom temperatures are given at 32 of hese stations, ranging from 1.1° to 76.3° F. (5.0° to 4.6° C.), the average 53.8° (12.1 C.).

These stations cover the rchipelago rather well, and o the south occur in the ollowing localities: Sibuko ay, Borneo; Gulf of Tomini, elebes; Molucca Passage; etween Gillolo and Makyan sland; between Gillolo and Kayoa; Molucca Sea; and Buton Strait.



FIGS. 22, 23.—QUINQUELOCULINA LAMARCKIANA D'ORBIGNY. × 50. FROM ALBATROSS STATION D5220. 22, APERTURAL VIEW OF YOUNG SPECIMEN WITH SIMPLE ELONGATE TOOTH. 23, ADULT SPECIMEN WHICH HAS DEVELOPED A BIFID TOOTH AND A MORE ROUNDED APERTURE.

The species may be distinguished by the very highly polished angular test, the aperture flush with no definite neck, and a single, simple tooth.

*Quinqueloculina lamarckiana—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 11030 | U.S.N.M. | 6 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s. sh. | Common. |
| 11031 | U.S.N.M. | 10 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Common. |
| 11032 | U.S.N.M. | 2 | D5105... | 14 43 55 N.; 120 12 50 E.. | 25 | ....... | ........... | Few. |
| 11033 | U.S.N.M. | 1 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m........ | Rare. |
| 11034 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 109 | ....... | dk. gn. m.... | Rare. |
| 11035 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N. 15°; W., 0.30 mile. | 26 | ....... | gn. m., s..... | Common. |
| 11036 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 52°; E., 1.50 miles. | 38 | ....... | gn. m., s..... | Common. |
| 11037 | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s........ | Few. |
| 11038 | U.S.N.M. | 2 | D5136... | 6 04 20 N.; 120 59 20 E.. | 22 | ....... | s., sh........ | Few. |
| 11039 | U.S.N.M. | 1 | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s......... | Rare. |
| 11040 | U.S.N.M. | 5 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh..... | Common. |
| 11041 | U.S.N.M. | 2 | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Few. |
| 11042 | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| 11043 | U.S.N.M. | 10+ | D5145... | 6 04 30 N.; 120 59 30 E.. | 23 | ....... | co. s., sh..... | Common. |
| 11046 | U.S.N.M. | 2 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh..... | Rare. |
| 11044 | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s......... | Rare. |
| 11045 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E.. | 12 | ....... | s............ | Rare. |
| 11047 | U.S.N.M. | 3 | D5162... | 5 10 00 N.; 119 47 30 E.. | 230 | 52.9 | crs. s., brk. sh. | Rare. |
| 11048 | U.S.N.M. | 3 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| 11049 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Common. |
| 11050 | U.S.N.M. | 6 | D5197... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Common. |
| 11051 | U.S.N.M. | 2 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 53.9 | gn. m........ | Few. |
| 11052 | U.S.N.M. | 10+ | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m..... | Common. |
| 11053 | U.S.N.M. | 1 | D5206... | 11 31 40 N.; 124 42 40 E.. | 32 | ....... | gn. m........ | Rare. |
| 11054 | U.S.N.M. | 6 | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s..... | Common. |
| | | | D5211... | 11 51 35 N.; 124 14 00 E.. | 155 | 56.6 | gn. m., s..... | Few. |
| 11055 | U.S.N.M. | 5 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s., m..... | Few. |

*Quinqueloculina lamarckiana*—Material examined—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 11056 | U.S.N.M. | 4 | D5213 | 12 15 00 N.; 123 57 30 E. | 80 | ...... | s., m., sh. | Few. |
| 11057 | U.S.N.M. | 1 | D5214 | 12 25 18 N.; 123 27 15 E. | 218 | 51.4 | gn. m. | Few. |
| 11058 | U.S.N.M. | 10+ | D5217 | 13 20 00 N.; 123 14 15 E. | 165 | 63.1 | crs. gy. s. | Common. |
| 11059 | U.S.N.M. | 10+ | D5229 | 13 25 00 N.; 121 58 00 E. | 50 | ...... | sft. gn. m. | Abundant. |
| 11060 | U.S.N.M. | 1 | D5227 | 12 53 45 N.; 121 52 30 E. | 322 | ...... | gn. m. | Rare. |
| 11061 | U.S.N.M. | 1 | D5256 | 7 08 00 N.; 125 30 00 E. | 100 | ...... | sft. m. | Rare. |
| 11062 | U.S.N.M. | 10+ | D5250 | 11 57 30 N.; 121 42 15 E. | 317 | 49.3 | gy. m., glob. | Common. |
| 11063 | U.S.N.M. | 3 | D5261 | 12 30 55 N.; 121 34 24 E. | 145 | ...... | s., m. | Rare. |
| 11064 | U.S.N.M. | 2 | D5276 | 13 40 15 N.; 120 14 45 E. | 18 | ...... | sh., p., s. | Rare. |
| | | | D5277 | 13 56 55 N.; 120 13 45 E. | 30 | 56.6 | fne. s. | Few. |
| 11065 | U.S.N.M. | 1 | D5301 | 20 37 00 N.; 115 43 00 E. | 288 | 59.5 | gy. m., s. | Rare. |
| 11066 | U.S.N.M. | 5 | D5277 | 13 56 55 N.; 120 13 45 E. | 30 | 56.6 | fne. s. | Few. |
| 11067 | U.S.N.M. | 10+ | D5311 | 21 33 00 N.; 116 15 00 E. | 88 | ...... | crs. s., sh. | Common. |
| 11068 | U.S.N.M. | 10+ | D5313 | 21 30 00 N.; 116 43 00 E. | 150 | 58.6 | s. | Common. |
| 11069 | U.S.N.M. | 10+ | D5315 | 21 40 00 N.; 116 58 00 E. | 148 | 54.4 | s., sh. | Common. |
| 11070 | U.S.N.M. | 5 | D5336 | 11 33 45 N.; 119 24 45 E. | 43 | ...... | co. s., sh. | Few. |
| 11071 | U.S.N.M. | 3 | D5342 | 10 56 55 N.; 119 17 24 E. | 14-25 | ...... | gy. m. | Few. |
| 11072 | U.S.N.M. | 7 | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co. s. | Few. |
| 11073 | U.S.N.M. | 10 | D5358 | 6 06 40 N.; 118 18 15 E. | 30 | ...... | m. | Common. |
| 11074 | U.S.N.M. | 6 | D5369 | 13 48 00 N.; 121 43 00 E. | 106 | ...... | bk. s. | Common. |
| 11075 | U.S.N.M. | 6 | D5370 | 13 44 15 N.; 121 42 30 E. | 150 | 54.3 | sft. m. | Common. |
| 11076 | U.S.N.M. | 8 | D5381 | 13 14 15 N.; 122 44 45 E. | 88 | ...... | co. s. | Common. |
| 11077 | U.S.N.M. | 1 | D5385 | 13 24 50 N.; 123 08 70 E. | 327 | 62.4 | gy. m. | Rare. |
| 11078 | U.S.N.M. | 2 | D5398 | 11 35 12 N.; 124 13 48 E. | 114 | ...... | gn. m. | Rare. |
| 11079 | U.S.N.M. | 1 | D5408 | 10 40 15 N.; 124 15 00 E. | 150 | 56.4 | gn. m. | Rare. |
| 11080 | U.S.N.M. | 1 | D5419 | 9 58 30 N.; 123 46 00 E. | 175 | 54.5 | gn. m. | Rare. |
| 11081 | U.S.N.M. | 1 | D5420 | 9 40 35 N.; 123 45 00 E. | 127 | 58.0 | ...... | Rare. |
| 11082 | U.S.N.M. | 3 | D5423 | 9 38 30 N.; 121 11 00 E. | 508 | 49.8 | gy. m., co. s. | Few. |
| 11083 | U.S.N.M. | 2 | D5424 | 9 37 05 N.; 121 12 37 E. | 340 | 50.4 | co. s. | Few. |
| 11084 | U.S.N.M. | 1 | D5425 | 9 37 45 N.; 121 11 00 E. | 406 | 49.4 | gy. m., co. s. | Rare. |
| 11085 | U.S.N.M. | 2 | D5428 | 9 13 00 N.; 118 51 15 E. | 1,105 | 49.7 | gy. m. | Rare. |
| 11086 | U.S.N.M. | 1 | D5429 | 9 41 30 N.; 118 50 22 E. | 706 | ...... | gn. m. | Rare. |
| 11087 | U.S.N.M. | 4 | D5443 | 12 43 05 N.; 125 01 00 E. | 241 | 51.3 | co. s., sh. | Rare. |
| 11088 | U.S.N.M. | 1 | D5446 | 12 43 51 N.; 124 50 18 E. | 300 | ...... | gn. m. | Rare. |
| 11089 | U.S.N.M. | 1 | D5469 | 13 36 48 N.; 123 38 24 E. | 300 | ...... | gn. m. (net). | Rare. |
| 11090 | U.S.N.M. | 2 | D5487 | 10 02 45 N.; 125 05 23 E. | 732 | 52.1 | gn. m. | Rare. |
| 11091 | U.S.N.M. | 1 | D5523 | 8 48 44 N.; 123 27 35 E. | ...... | ...... | ...... | Rare. |
| 11092 | U.S.N.M. | 1 | D5537 | 9 11 00 N.; 123 23 00 E. | 254 | 58.5 | gn. m. | Rare. |
| 11093 | U.S.N.M. | 2 | D5538 | 9 08 15 N.; 123 23 20 E. | 256 | 53.5 | gn. m., s. | Rare. |
| 11094 | U.S.N.M. | 3 | D5543 | 8 47 15 N.; 123 35 00 E. | 162 | 54.5 | s. | Rare. |
| 11095 | U.S.N.M. | 1 | D5565 | 5 41 42 N.; 120 30 20 E. | 243 | 52.3 | s., ptr., sh. | Rare. |
| 11096 | U.S.N.M. | 1 | D5569 | 5 33 15 N.; 120 15 30 E. | 303 | 52.3 | co. s. | Rare. |
| 11097 | U.S.N.M. | 4 | D5585 | 4 07 00 N.; 118 49 54 E. | 476 | 41.1 | gy. m. | Rare. |
| 11098 | U.S.N.M. | 2 | D5586 | 4 06 50 N.; 118 47 20 E. | 347 | 44.0 | gy. m. | Rare. |
| 11099 | U.S.N.M. | 7 | D5590 | 4 10 50 N.; 118 39 35 E. | 310 | 44.3 | gn. m., s. | Few. |
| 11100 | U.S.N.M. | 4 | D5613 | 0 42 00 S.; 121 44 00 E. | 752 | ...... | gy. m. | Few. |
| 12573 | U.S.N.M. | 2 | D5571 | 5 30 45 N.; 120 07 57 E. | 334 | 52.3 | s. | Rare. |
| 12570 | U.S.N.M. | 4 | D5618 | 0 37 00 N.; 127 15 00 E. | 417 | ...... | gy. m. | Few. |
| 12571 | U.S.N.M. | 1 | D5621 | 0 15 00 N.; 127 24 35 E. | 298 | ...... | gy. and bk. s. | Few. |
| 12569 | U.S.N.M. | 1 | D5627 | 0 06 00 N.; 127 26 00 E. | 22 | ...... | m. | Few. |
| | | | D5639 | 3 54 50 S.; 123 27 20 E. | 1,560 | ...... | gy. m. | Few. |
| 12572 | U.S.N.M. | 2 | D5640 | 4 27 00 S.; 122 55 40 E. | 24 | ...... | s., brk. sh. | Few. |
| | | | H4898 | 7 43 45 N.; 122 03 45 E. | 221 | ...... | gy. m., glob. | Rare. |
| 12574 | U.S.N.M. | 6 | .......... | Tara Island, P. I. | ...... | ...... | ...... | Few. |
| 12575 | U.S.N.M. | 2 | .......... | Tayabas Gulf. | ...... | ...... | ...... | Rare. |

## QUINQUELOCULINA VENUSTA Karrer.

Plate 91, figs. 2*a–c*.

*Quinqueloculina venusta* Karrer, Sitz. Akad. Wiss. Wien, vol. 57, 1868, p. 147, pl. 2, fig. 6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 45, pl. 11, fig. 1.
*Miliolina venusta* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 162, pl. 5, figs. 5, 7.

This seems to be a rare species in the Philippine region. It has occurred at seven stations, ranging in depth from 21 to 340 fathoms (39 to 622 meters), the average depth being 117 fathoms (201 meters).

Bottom temperatures are given at only three stations, ranging from 52.3° to 59.0° F. (11.2° to 15.0° C.), the average temperature 54.9° F. (12.7° C.).

These stations include the following localities: Sulu Archipelago, off Siasi Island; off northern Cebu; China Sea, off Hongkong; between Cebu and Bohol; between Samar and Leyte; and north of Tawi Tawi.

*Quinqueloculina venusta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 13911 | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh.... | Rare. |
| 13912 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| 13913 | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Rare. |
| 13917 | U.S.N.M. | 1 | D5312... | 21 30 00 N.; 116 43 00 E... | 150 | 53.6 | s............. | Rare. |
| 13914 | U.S.N.M. | 2 | D5420... | 9 49 35 N.; 123 45 00 E... | 127 | 59.0 | .............. | Rare. |
| 13915 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Rare. |
| 13916 | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E... | 340 | 52.3 | s., sh........ | Rare. |

### QUINQUELOCULINA PROCERA (Goës).

Plate 88, figs. 3*a–c*.

*Miliolina procera* Goës, Bull. Mus. Comp. Zoöl., vol. 29, 1896, p. 82, pl. 7, figs. 7-9.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 6, pl. 1, figs. 11-14.

*Quinqueloculina procera* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 45, pl. 19, fig. 2.

At a single station, D5236, Pacific Ocean, off the east coast of Mindanao, in 494 fathoms (903 meters), this species is very abundant and typical. It was not seen elsewhere in the region.

Sidebottom records this form from off the east coast of Australia, in 465 fathoms (850 meters), which is close to the Philippine station in depth.

The original material of Goës was from off the Galapagos Island, and I have recorded it from *Albatross* D3346, off the west coast of the United States. From these scattered stations it would seem to be widely distributed in comparatively deep water in the Pacific Ocean.

*Quinqueloculina procera—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 13837 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Abundant. |

### QUINQUELOCULINA APICULA, new species.

Plate 88, figs. 1, 2.

*Description.*—Test somewhat elongate, with five visible chambers, the initial end of each chamber with a long, rounded, somewhat pointed spine, which may be one-half the length of the chamber; periphery bluntly rounded, surface smooth; apertural end slightly truncate without a definite tooth; aperture lunar.

Length up to 2.2 mm.

*Distribution.*—Type specimen (Cat. No. 13868, U.S.N.M.) from *Albatross* station D5236, in 494 fathoms (903 meters), Pacific Ocean, east coast of Mindanao.

This species, with test very peculiar, and long basal spine, which appear often at both ends of the test, is not uncommon at this one station, where so many other peculiar species have been taken.

*Quinqueloculina apicula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13868 | U.S.N.M. | 3 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |

### QUINQUELOCULINA LIMBATA d'Orbigny.

*Quinqueloculina limbata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 20.—FORNASINI, Mem. Accad. Sci. Bologna, ser. 6, vol. 2, 1905, p. 66, pl. 3, fig. 9.
*Miliolina limbata* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 577, pl. 44, figs. 5–8.

D'Orbigny's original specimens are from the Red Sea, and this seems to be a species with Indo-Pacific distribution. Heron-Allen and Earland had it from the Kerimba Archipelago, and it has occurred at two stations, D5313, China Sea off Hongkong, 150 fathoms (275 meters), and D5369, off Marinduque Island, 106 fathoms (194 meters), in the Philippine material.

The specimens have the highly polished surface characteristic of this species.

*Quinqueloculina limbata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13839 | U.S.N.M. | 10+ | D5313... | 21 30 00 N.; 116 43 00 E.. | 150 | 53.6 | s............ | Common. |
| 13840 | U.S.N.M. | 2 | D5369... | 13 48 00 N.; 121 43 00 E.. | 106 | ....... | bk. s......... | Rare. |

### QUINQUELOCULINA CRASSA d'Orbigny, var. SUBCUNEATA, new variety.

Plate 89, figs. 4a–c.

*Miliolina crassa* HERON-ALLEN and EARLAND (part) (not d'Orbigny), Trans. Zool. Soc. London, vol. 20, 1915, p. 572, pl. 42, fig. 41 (not 37–40).

*Description.*—Test like the typical in ornamentation, but short and the chambers wedge-shaped, almost sharp at the peripheral angles.

*Distribution.*—Type specimen (Cat. No. 13847, U.S.N.M.) from *Albatross* station D5179, off Romblon.

This is evidently the variety figured by Heron-Allen and Earland as "small acute-edged variety," as above noted. It is found at several stations. All the Philippine material which can be referred to this species is of this variety.

The material has occurred at 13 stations, ranging in depth from 12 to 221 fathoms (22 to 405 meters), the average being 62 fathoms (114 meters). The bottom temperature was given but for a single station, 75.7° F. (24.2° C.), where the depth was 37 fathoms (68 meters).

The localities are as follows: Vicinity of Romblon; Sulu Archipelago; Tawi Tawi Group; off Jolo; off western Mindanao; Verde Island Passage; off western Bohol; and between Burias and Luzon.

*Quinqueloculina crassa*, var. *subcuneata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13841 | U.S.N.M. | 3 | D5138... | 6 06 00 N.; 120 58 50 E.. | 19 | ....... | s., Co........ | Few. |
| 13842 | U.S.N.M. | 1 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh..... | Rare. |
| 13843 | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s......... | Rare. |
| 13844 | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh..... | Rare. |
| 13845 | U.S.N.M. | 1 | D5158... | 5 12 00 N.; 119 54 30 E.. | 12 | ....... | crs. s., sh.... | Rare. |
| 13846 | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 13847 | U.S.N.M. | 8 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Common. |
| 13849 | U.S.N.M. | 1 | D5250... | 9 31 50 N.; 124 02 05 E.. | ....... | ....... | ............... | Rare. |
| 13848 | U.S.N.M. | 3 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s........ | Rare. |
| 13850 | U.S.N.M. | 2 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Rare. |
| 13851 | U.S.N.M. | 3 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., h..... | Rare. |
| 13852 | U.S.N.M. | 1 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m............. | Rare. |
| 13853 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob.. | Rare. |

### QUINQUELOCULINA RECTA, new species.

Plate 84, figs. 5a–c.

*Description.*—Test elongate, three to four times as long as wide surface ornamented by a few strong costae, rounded, peripheral face, and whole chamber rounded in section, the periphery of the last-formed chamber in side view forming a straight line for a large part of its length; apertural end but slightly extended, no neck being formed; the area slightly back from the aperture smooth, the aperture itself with a slightly everted lip, tooth simple.

Length 1 to 1.25 mm.

*Distribution.*—Type specimen (Cat. No. 13836, U.S.N.M.) from *Albatross* station D5570, north of Tawi Tawi, 330 fathoms (604 meters). It also occurs off Romblon and off Jolo.

These stations are all, except the type station, in comparatively shallow water, ranging in depth from 19 to 78 fathoms (35 to 143 meters). Bottom temperature in shallow water, 75.7° F. (24.2° C.) in deeper water, 52.3° F. (11.2° C.).

*Quinqueloculina recta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13832 | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Rare. |
| 13834 | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | co. s., sh..... | Rare. |
| 13835 | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| 13833 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Rare. |
| 13836 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E.. | 330 | 52.3 | fne. s., glob. | Rare. |

### QUINQUELOCULINA DISPARILIS d'Orbigny.

Plate 86, figs. 1*a*–*c*.

*Quinqueloculina disparilis* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 21.—SCHLUMBERGER, Mém. Soc. Zool. France, vol. 6, 1893, p. 212, pl. 2, figs. 55–57, figs. 21, 22 (in text).

*Miliolina disparilis* WIESNER, Archiv. Prot., vol. 25, 1912, p. 216.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 577.

In its typical form this is an elongate test, with the chambers having the outer peripheral face broadly rounded, but flattened and ornamented with a number of fine longitudinal costae, closely set, the sides meeting the peripheral face nearly at right angles, making a definite angle at either side; the aperture with a simple and slightly bifid tooth. This species in the Philippine regions reaches a length of 1.5 mm. or more. The specimen I figured from the North Pacific[a] does not belong to this species. In the Philippines very typical specimens occurred at nine stations, ranging in depth from 27 to 303 fathoms (50 to 554 meters), the average depth being 133 fathoms (243 meters). Bottom temperatures are given for three stations, ranging from 52.3° F. to 55.8° F. (11.2° to 13.2° C.), with the average temperature 53.8° F. (12.1° C.).

This species includes the following localities: Off Romblon; between Marinduque and Luzon; Jolo Sea; eastern Palawan; north of Tawi Tawi; and to the south, one station in Darvel Bay, Borneo.

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[a] Bull. 71, U. S. Nat. Mus., pt. 6, 1917, pl. 14, fig. 1.

At the first of these stations, in 78 fathoms (143 meters), the species was common, and occurred in few numbers at the others. D'Orbigny's type specimens came from the Mediterranean, as did those of Schlumberger and Wiesner. Heron-Allen and Earland record it from the Kerimba Archipelago, and our specimens extend its range considerably.

*Quinqueloculina disparilis—Material examined.*

| t. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13 | U.S.N.M. | 1 | D5175... | 9 21 00 N.; 121 37 45 E.. | ....... | ....... | ............... | Rare. |
| 14<br>33 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Common. |
| 15 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Rare. |
| 16 | U.S.N.M. | 4 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m........... | Few. |
| 17 | U.S.N.M. | 1 | D5426... | 9 12 00 N.; 118 28 00 E.. | 27 | ....... | fne. gy. s.... | Rare. |
| 18 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E.. | 303 | 52.3 | co. s......... | Raw. |
| 19 | U.S.N.M. | 3 | D5576... | 5 25 56 N.; 120 03 39 E.. | 277 | 53.3 | s............ | Raw. |
| 20 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E.. | 162 | 55.8 | br. s., Co.... | Rare. |
| 21 | U.S.N.M. | 8 | D5642... | 4 31 40 S.; 122 42 36 E... | 215 | ....... | gn. m....... | Common. |

### QUINQUELOCULINA BOUEANA d'Orbigny.

Plate 89, fig. 5.

*Quinqueloculina boueana* D'ORBIGNY, Foram. Foss. Vienne, 1846, p. 293, pl. 19, figs. 7-9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 50, pl. 15, fig. 2.

*Miliolina boueana* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 173, pl. 7, figs. 13*a-c*.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 581.

A very few, mostly triloculine, specimens are placed under this name for want of a better one, as the material is very meager. Heron-Allen and Earland record the species from the Kerimba Archipelago. The Philippine stations are D5148, Sulu Archipelago, off Siasi, 17 fathoms (31 meters); D5181, off eastern Panay, 26 fathoms (48 meters); and D5358, Jolo Sea, 39 fathoms (71 meters).

*Quinqueloculina boueana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13630 | U.S.N.M. | 1 | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co. s......... | Rare. |
| 13631 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s.... | Rare. |
| 13632 | U.S.N.M. | 1 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m........... | Rare. |

### QUINQUELOCULINA BICORNIS (Walker and Jacob), var. ELEGANS Williamson.

*Miliolina bicornis*, var. *elegans* WILLIAMSON, Recent Foraminifera of Great Britain, 1858, p. 88, pl. 7, fig. 195.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 171, pl. 6, figs. 9-11, 12.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 48.

Numerous specimens, with the slender neck and more slender form characteristic of this variety, were found at *Albatross* station D5338, Palawan Passage, in 43 fathoms (78 meters). This variety has bee noted from the Hawaiian Islands.

*Quinqueloculina bicornis* var. *elegans*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13838 | U.S.N.M. | 7 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | co. s., m.... | Common. |

QUINQUELOCULINA CURTA Cushman.

Plate 100, figs. 1, 2.

*Miliolina cuvieriana* MILLETT (not d'Orbigny), Journ. Roy. Micr. Soc., 1898, p 505, pl. 12, figs. 2*a*, *b*.

*Quinqueloculina disparilis* D'ORBIGNY, var. *curta* CUSHMAN, Bull. 71, U. S. Na Mus., pt. 6, 1917, p. 49, pl. 14, fig. 2; fig. 30 (in text).

This species, figured by Millett from the Malay Archipelago an which I described as a variety of *Q. disparilis* from southern Japan is very common, often abundant, in the Philippine region, where it reaches a large size. The test is characterized by broad peripheral angles, which are marked by several coarse costae. The sides of the chambers are either unornamented or with fine wrinkle-like markings The younger specimens, as is usual in many species, are shorter tha the adult, and later become somewhat longer than broad. The test is a dull cream-white color. The aperture has a thickened wall, an the tooth development is very large and complex. The stages i development of this complex aperture are very interesting.

Length up to 3 mm.

The megalospheric form has a large proloculum and a secon cornuspiralike chamber, which is ornamented with several costae, as shown in the figure. From a study of d'Orbigny's original description and figures, together with the recent material which I obtained in the shallow water of the West Indies, this possibly may be *Q. cuvieriana*. It is a species with sharp angles, often carinate, with slight, partially developed, costae at either side. D'Orbigny's figure of this species is very accurate when compared with shallow-water West Indian material, and evidently represents a definite species in that region. The material figured by Millett under this name is undoubtedly the same as that which I had from southern Japan, and which is now found to be abundant in the Philippine region. The species is characteristic of shallow water; specimens become few and rare as depth greater than 100 fathoms is reached. All the stations of this species are in the Archipelago except one. These include the following localities: China Sea, off southern Luzon;

Sulu Sea, off southern Panay; near Basilan Island; off Jolo; off Tawi Tawi; off Romblon; off eastern Panay; off northern Cebu; off estern Samar; east of Masbate; off southeastern Mindoro; Palawan assage; Malampaya Sound, Palawan Island; Ragay Gulf, Luzon; etween Cebu and Bohol; and one station to the south in Darvel y, Borneo. There are 35 stations at which material is found. hese range in depth from 18 to 400 fathoms (33 to 732 meters), the erage depth 95 fathoms (174 meters). The bottom temperature is en at nine stations, ranging from 49.6° to 76.3°F. (19.8° to 24.6° C.), e average temperature being 55.3° F. (12.9° C.). As these are om some of the deeper stations, the average temperature for the tire number would probably be considerably higher. This is, then, pecies of comparatively shallow, warm waters of the tropics, and ould be found to be common in the warm area to the south under milar conditions. At some of the stations, especially in the China a off southern Luzon, and in parts of the Sulu region, it occurs very bundantly, making up a considerable proportion of the bottom amples.

*Quinqueloculina curta—Material examined.*

|  | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  | ° ′ ″ ° ′ ″ |  | °F. |  |  |
| [illegible] | U.S.N.M. | 10+ | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gn. m., sh., s. | Common. |
| [illegible] | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., sh., s. | Abundant. |
| [illegible] | U.S.N.M. | 10+ | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Abundant. |
| 11000 | U.S.N.M. | 8 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | .............. | Common. |
| 11001 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N. 15°; W., 0.30 mile. | 26 | ....... | gn. m., s.... | Abundant. |
| 11002 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 52°; E., 1.50 miles. | 38 | ....... | gn. m., s.... | Abundant. |
| 11003 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s......... | Abundant. |
| 11004 | U.S.N.M. | 10+ | D5143... | 6 06 50 N.; 121 02 15 E... | 19 | ....... | co. s.......... | Common. |
| 11005 | U.S.N.M. | 10+ | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Common. |
| 11006 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Common. |
| 11007 | U.S.N.M. | 6 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 11008 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| 11009 | U.S.N.M. | 3 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s.... | Few. |
| 11010 | U.S.N.M. | 4 | D5213... | 12 15 00 N.; 123 57 30 E... | 80 | ....... | s., m., sh.... | Few. |
| 11011 | U.S.N.M. | 7 | D5261... | 12 30 55 N.; 121 34 24 E... | 145 | ....... | s., m.......... | Common. |
| 11012 | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Common. |
| 11013 | U.S.N.M. | 7 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s......... | Common. |
| 11014 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E... | 201 | 50.4 | dk. gy. s.... | Rare. |
| 11015 | U.S.N.M. | 3 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh......... | Few. |
| 11016 | U.S.N.M. | 6 | D5336... | 11 37 45 N.; 119 46 00 E... | 46 | ....... | s., m.......... | Common. |
| 11017 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., m..... | Common. |
| 11018 | U.S.N.M. | 10+ | D5339... | 11 22 00 N.; 119 12 00 E... | 52 | ....... | m............. | Common. |
| 11019 | U.S.N.M. | 3 | D5342 | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m......... | Few. |
| 11020 | U.S.N.M. | 3 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s.......... | Few. |
| 11021 | U.S.N.M. | 3 | D5358... | 6 06 40 N.; 118 18 15 E... | 39 | ....... | m............. | Few. |
| 11022 | U.S.N.M. | 10+ | D5369... | 13 48 00 N.; 121 43 00 E... | 106 | ....... | bk. s.......... | Few. |
| 11023 | U.S.N.M. | 1 | D5377... | 13 26 00 N.; 122 19 00 E... | 400 | 49.6 | sft. gn. m.... | Rare. |
| 11024 | U.S.N.M. | 6 | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | co. s.......... | Few. |
| 11025 | U.S.N.M. | 2 | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m............. | Few. |
| 11026 | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.4 | gy. m., s..... | Few. |
| 11027 | U.S.N.M. | 10+ | D5426... | 9 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s.... | Common. |
| 11028 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob.. | Rare. |
| 11029 | U.S.N.M. | 2 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co... | Rare. |

### QUINQUELOCULINA BICARINATA d'Orbigny.

Plate 86, figs. 2, 3; plate 100, fig. 7.

*Quinqueloculina bicarinata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 35.- TERQUEM, Mém. Soc. géol. France, ser. 3, vol. 1, 1878, pl. vii (xii), figs. 10a-

In the Philippine material there is a very widely distribute species which is characterized by two somewhat rounded carinae the outer border of each chamber. These are apparently identic with the *Q. bicarinata* d'Orbigny, as figured by Terquem. It form one of the characteristic species both in the Archipelago and sout ward in shallow water. It is always short and broad, the centr part especially bicarinate, but the carinae often coalescing towa either end. It is occasionally slightly striate, but it is not the san as *Q. cuvieriana*. It was recorded at 41 stations in the area, rangin in depth from 10 to 1,262 fathoms (18 to 2,309 meters), the averag depth 104 fathoms (191 meters). Bottom temperatures are give for six stations, all of them in the deeper water. These range fro 52.3° to 56.4 F. (11.2° to 13.5° C.).

The stations for this species range well over the Archipelago an in the Sulu Sea, and to the southward in Darvel Bay, Borneo; Pi Passage; and Buton Strait.

*Quinqueloculina bicarinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13568 | U.S.N.M. | 3 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s., sh. | Few. |
| 13527 | U.S.N.M. | 6 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s......... | Common. |
| 13528 | U.S.N.M. | 1 | D5105... | 14 43 55 N.; 120 12 50 E.. | 25 | ....... | .............. | Rare. |
| 13529 | U.S.N.M. | 7 | D5106... | 12 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m......... | Common. |
| 13530 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s......... | Common. |
| 13531 | U.S.N.M. | 4 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh......... | Common. |
| 13532 | U.S.N.M. | 8 | D5137... | 6 04 25 N.; 120 58 30 E... | 20 | ....... | s., sh......... | Common. |
| 13533 | U.S.N.M. | 2 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., Co......... | Few. |
| 13534 | U.S.N.M. | 6 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Common. |
| 13535 | U.S.N.M. | 4 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s......... | Few. |
| 13536 | U.S.N.M. | 10 | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh..... | Common. |
| 13537 | U.S.N.M. | 9 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Common. |
| 13538 | U.S.N.M. | 6 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Few. |
| 13539 | U.S.N.M. | 10 | D5145... | 6 04 30 N.; 120 59 30 E... | ....... | ....... | .............. | Common. |
| 13540 | U.S.N.M. | 6 | D5146... | 5 46 40 N.; 120 48 50 E... | 24 | ....... | co. s......... | Common. |
| 13541 | U.S.N.M. | 2 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s......... | Rare. |
| 13542 | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Common. |
| 13543 | U.S.N.M. | 10+ | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh..... | Common. |
| 13544 | U.S.N.M. | 7 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s., sh..... | Few. |
| 13545 | U.S.N.M. | 5 | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh.... | Common. |
| 13546 | U.S.N.M. | 1 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Rare. |
| 13547 | U.S.N.M. | 4 | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | crs. s., brk. sh. | Few. |
| 13548 | U.S.N.M. | 10+ | D5164... | 5 01 40 N.; 119 32 50 E... | 18 | ....... | gn. m......... | Common. |
| 13549 | U.S.N.M. | 9 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| 13550 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |
| 13551 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Common. |
| 13552 | U.S.N.M. | 3 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Few. |
| 13553 | U.S.N.M. | 1 | D5336... | 11 37 45 N.; 119 46 00 E... | 46 | ....... | s., m......... | Rare. |
| 13554 | U.S.N.M. | 5 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s. m..... | Common. |
| 13555 | U.S.N.M. | 8 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m......... | Common. |
| 13556 | U.S.N.M. | 6 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s......... | Common. |
| 13557 | U.S.N.M. | 4 | D5358... | 6 08 40 N.; 118 18 15 E... | 39 | ....... | m............. | Common. |
| 13558 | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E... | 98 | ....... | co. s......... | Rare. |
| 13559 | U.S.N.M. | 9 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Common. |
| 13560 | U.S.N.M. | 1 | D5549... | 6 01 15 N.; 120 44 20 E... | 263 | 52.3 | s., glob., for.. | Rare. |
| 13561 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............. | Rare. |
| 13562 | U.S.N.M. | 2 | D5574... | 5 30 45 N.; 120 07 37 E... | 340 | ....... | .............. | Rare. |
| 13563 | U.S.N.M. | 3 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Rare. |
| 13564 | U.S.N.M. | 1 | D5579... | 4 54 15 N.; 119 09 52 E... | 175 | 55.3 | fne. s., Co... | Rare. |
| 13567 | U.S.N.M. | 2 | D5636... | 1 55 00 S.; 127 42 30 E... | 1,262 | ....... | gy. m., fne. s. | Rare |
| 13566 | U.S.N.M. | 2 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh.. | Rare. |
| 13565 | U.S.N.M. | 4 | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy. m......... | Rare. |

### QUINQUELOCULINA FERUSSACII d'Orbigny.

Plate 90, figs. 2*a–c*.

*Quinqueloculina ferussacii* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 301, No. 18.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 50, pl. 19, figs. 3, 4.

*Miliolina ferussacii* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 175, pl. 113, figs. 17, *a*, *b*.—MILLETT, Journ. Roy. Micr. Soc., 1898, p. 507, pl. 12, figs. 6, 7.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 578.

Specimens with the projecting slender neck and the acute marginal carinae typical of this species were found at a few stations, but never in any quantity. Of the seven stations at which this species is recorded the depth ranges from 18 to 148 fathoms (33 to 271 meters), the average being 61 fathoms (112 meters). Bottom temperature was given for the deepest station 54.4° F. (12.4° C.); none of the others are given. Therefore the average would be much above this figure. The localities are as follows: China Sea, off southern Luzon; Sulu Archipelago, off Tawi Tawi; vicinity of Romblon; off eastern Panay; off northern Cebu; Gulf of Davao; and China Sea, off Formosa. Specimens were frequent at two of the shallower stations and rare at the others. Heron-Allen and Earland record it "not widely distributed, but very fine and typical examples occur at several stations, though not in any numbers." They also mention that the form figured by Brady[40] "represents a type which is of much more frequent occurrence (than d'Orbigny's type) in tropical gatherings, having long, narrow chambers with little curvature, produced tubular neck, and strong, acute, marginal, facial carinae." This evidently is the same as the form that we have had from the Philippines.

*Quinqueloculina ferussacii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 12904 | U.S.N.M. | 3 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ........ | gy.m., s., sh. | Rare. |
| 12905 | U.S.N.M. | 1 | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ........ | gn. m........ | Rare. |
| 12906 | U.S.N.M. | 8 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ........ | m, fne. s..... | Frequent. |
| [illegible] | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ........ | fne. s......... | Rare. |
| [illegible] | U.S.N.M. | 6 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ........ | gn. s......... | Frequent. |
| 12909 | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ........ | sft. m........ | Rare. |
| 12910 | U.S.N.M. | 3 | D5315... | 21 40 00 N.; 116 58 00 E.. | 148 | 54.4 | s., sh........ | Rare. |

### QUINQUELOCULINA RUGOSA d'Orbigny.

Plate 100, figs. 6*a–c*.

*Quinqueloculina rugosa* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 24.—SCHLUMBERGER, Mém. Soc. Zool. France, 1893, p. 210, text figs. 18, 19, pl. 4, figs. 91–93.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 53.

This species, of which abundant specimens appear at some stations, seems to be well characterized. Schlumberger revived this species of d'Orbigny's, described in 1826, for recent material of his from the Gulf of Marseilles. I have referred to it in a recent paper (Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 53), tropical and subtropical material from the North Pacific, from the Hawaiian Islands, Japan, Hongkong, and Manila Bay. Its surface has a peculiarl individual character, rugose, not from accretions of extraneous matter, but from what seems an eroded character; the test, especiall the outer wall, being conspicuously pitted and rugose. This character persists at various ages, and in the whole series of adults fron numerous stations, in fact, it is one of the most characteristic specie of the Philippine material. Heron-Allen and Earland in thei Kerimba paper [41] refer to this species as related to *Q. contorta:*

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[40] Challenger, pl. 113, fig. 17.

> Almost universally distributed, abundant, and attaining very fine proportions some stations, especially at stations 9, 12, and ?X. There is, as usual, a considerabl number of specimens passing into *M. sclerotica*, the essential differenc between these two species being the nature of the superficial test. A station 1 the individuals all closely resemble the figure of *Quinqu loculina rugosa* given by Fornasini from the "Planchés inédites" (F 1905, Mem. Accad. Sci. Bologna, ser. 6, vol. 2, pl. 3, fig. 13) but the have a porcellaneous texture, although, like all other specimens of M *contorta*, the surface is matt. The nature of the shell of *Q. rugosa* must remain purely speculative, the species having its origin in a *nomen nudum*, the "Planché inédite" giving practically no guide to the texture. Schlumberger has identified d'Orbigny's specific name *rugosa* with specimens from Marseille (Mém. Soc. Zool. p. 68, pl. 4 (not 2), figs. 91–93, text figs. 18, 19), which differ considerably from the "Planché inédite" in external characteristics, but which are described as having a rough surface ("Tête d'apparence rugose"); they appear, therefore, to be a form of *M. sclerotica.*

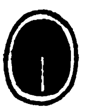

FIG. 24.—QUINQUELOCULINA RUGOSA D'ORBIGNY. APERTURE AND UNDIVIDED SIMPLE TOOTH OF EARLY STAGE. × 150, FROM ALBATROSS STATION D5164.

However, in the Philippine material *Q. contorta* occurs at several stations, but in all cases of depths from 200 to 300 fathoms (366 to 549 meters) or more, and while it has the matt surface it is never, in this material, to be confused with what I have here called *Q. rugosa.*

Moreover, the two are not found together at any station—a fact which seems rather remarkable. *Q. rugosa* is more at home apparently in shallow water, for it is there that specimens were most abundant and of the largest size. It is not related to *Q. sclerotica* Karrer, as the rugose character is not due in *Q. rugosa* to accretion of other material, as in *Q. sclerotica*, but results from the peculiar character of the original wall, as already noted. It would seem to be a species characteristic of comparatively shallow warm waters of the Mediterranean and Indo-Pacific regions. Wiesner notes the relations of *Q. rugosa* and *Q. contorta* in the material from the Adriatic.

The Philippine records include 16 stations, ranging in depth from 18 to 375 fathoms (33 to 686 meters), the average depth being 55 fathoms (100 meters). Bottom temperatures are given at but three stations, ranging from 56.4° F. (13.5° C.) at the deepest station to 79.5° F. (26.3° C.) at 38 fathoms (70 meters). The average temperature for all stations undoubtedly would be around 75° F. (23.8° C.). These stations include the following localities: Jolo Sea; Palawan Passage; China Sea off southern Luzon; between Marinduque and Luzon; off northern Cebu; northeastern Panay; vicinity of Romblon; Sulu Sea; Tawi Tawi Group, and off western Mindanao. It did not occur at all in the regions to the south, probably because of the depth of water.

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[41] Trans. Zool. Soc. London, 1915, vol. 20, p. 576.

*Quinqueloculina rugosa—material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| [illegible] | U.S.N.M. | 2 | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy. m., s., sh | Frequent. |
| [illegible] | U.S.N.M. | 7 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5105... | 14 43 55 N.; 120 12 50 E.. | 25 | ....... | ............... | Few. |
| [illegible] | U.S.N.M. | 4 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m....... | Few. |
| [illegible] | U.S.N.M. | 10+ | D5132... | Island off Panabutan Pt., N.; 15° W. 0.3 mile. | 26 | ....... | gn. m., s.... | Common. |
| [illegible] | U.S.N.M. | 7 | D5133... | Island off Panabutan Pt., N.; 52° E. 1.5 miles. | 38 | 79.5 | gn. m., s.... | Common. |
| [illegible] | U.S.N.M. | 10+ | D5164... | 5 01 40 N; 119 52 20 E.. | 18 | ....... | gn. m....... | Common. |
| [illegible] | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Rare. |
| [illegible] | U.S.N.M. | 9 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | fne. m., s.... | Common. |
| [illegible] | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Few. |
| [illegible] | U.S.N.M. | 6 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Few. |
| [illegible] | U.S.N.M. | 4 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Few. |
| [illegible] | U.S.N.M. | 1 | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | co. s., m .... | Few. |
| [illegible] | U.S.N.M. | 6 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s ....... | Frequent. |
| [illegible] | U.S.N.M. | 5 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m........... | Frequent. |
| [illegible] | U.S.N.M. | 2 | D5640... | 4 27 00 S.; 122 55 40 E.. | 24 | ....... | s., brk. sh... | Rare. |

### QUINQUELOCULINA POLYGONA d'Orbigny.

Plate 90, figs. 3*a*–*c*.

*Quinqueloculina polygona* D'ORBIGNY, in De La Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 198, pl. 12, figs. 21–23.

There are a few specimens which seem to be very close to this West Indian species described by d'Orbigny. This is placed by Heron-Allen and Earland as a synonym of *Q. ferussacii*, but in the Philippines the two seem to be distinct. In the West Indies this is a well-characterized species.

Specimens are rare at a few stations. They are decidedly concave on the periphery between the two keels, the lateral faces at right angles to the periphery, or even concave, while *Q. ferussacii* has extended single keels unless in the last-formed chamber.

The localities include the following: Sulu Archipelago, off Tawi Tawi; off eastern Panay; between Marinduque and Luzon; and the Palawan Passage.

They range in depth from 10 to 375 fathoms (18 to 686 meters) or less.

*Quinqueloculina polygona*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13831 | U.S.N.M. | 2 | D5159... | 50 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s.......... | Rare. |
| 13827 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E.. | 16 | ....... | fne. bk. s.... | Rare. |
| 13828 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s.... | Rare. |
| 13829 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Rare. |
| 13830 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | Co., s....... | Rare. |

### QUINQUELOCULINA BRADYANA Cushman.

*Miliolina undosa* H. B. Brady (not *Quinqueloculina undosa* Karrer), Rep. Vo *Challenger*, Zoology, vol. 9, 1884, p. 176, pl. 6, figs. 6–8.

*Quinqueloculina bradyana* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 5 pl. 18, fig. 2.

There are a very few specimens which seem referable to thi species. They are not at all alike and may represent more tha one form.

Specimens were noted at seven stations, ranging in depth from 10 to 318 fathoms (18 to 582 meters), the average depth being 93 fathoms (170 meters). These were mostly from shallow water about the islands in the Sulu Archipelago, off southern Luzon, and between Burias and Luzon.

*Quinqueloculina bradyana*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10804 | U.S.N.M. | 2 | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co.......... | Rare. |
| 10805 | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s......... | Rare. |
| 10806 | U.S.N.M. | 2 | D5160... | 5 12 40 N.; 119 55 10 E.. | 12 | ....... | s............. | Rare. |
| 10807 | U.S.N.M. | 2 | D5161... | 5 10 15 M.; 119 53 00 E.. | 16 | ....... | fne. s., blk. sp. | Few. |
| 10808 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ....... | fne. s., sh.... | Rare. |
| 10809 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s......... | Rare. |
| 10810 | U.S.N.M. | 4 | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., f... | Rare. |

### QUINQUELOCULINA CONTORTA d'Orbigny.

Plate 90, figs. 1*a*–*c*.

*Quinqueloculina contorta* d'Orbigny, Foram. Foss. Vienne, 1846, p. 298, pl. 20, figs. 4–6.

*Miliolina contorta* Brady, Journ. Roy. Micr. Soc., London, 1887, p. 881.—Halkyard, Trans. Ann. Rep. Manchester Micr. Soc., 1889, p. 60, pl. 1, fig. 4.—Sidebottom, Mem. Lit. Philos. Soc., Manchester, pt. 1, 1904, p. 13, pl. 4, figs. 7–9.—Earland, Journ. Quekett Micr. Club, 1905, p. 195.—Heron-Allen and Earland, Proc. Roy. Irish Acad., 1913, p. 30; Trans. Zool. Soc. London, vol. 20, 1915, p. 576.

Heron-Allen and Earland have suggested that this species and *Q. rugosa* may be the same species. In the Philippine material the two seem to be very different. Specimens referred to *Q. contorta* have occurred at six stations, ranging in depth from 200 to 340 fathoms (366 to 622 meters), the average 267 fathoms (489 meters). Bottom temperatures are very uniform. Those given for five stations range from between 52.2° F. to 54.3° F. (11.2° C. to 12.3° C.), the average being 52.7° F. (11.4° C.).

No specimens referred to this species occurred at less than 200 fathoms, while most of the specimens of *Q. rugosa* occurred in much shallower water. The surface in typical *Q. contorta* is smooth and matt, and is very different from the pitted surface of *Q. rugosa*. The stations for *Q.contorta* are in the following localities: Off northern Mindanao; off Jolo; between Jolo and Tawi Tawi: north of Tawi Tawi; and off western Mindanao, all of the stations but the first being in the Sulu Sea, where dredgings were made in comparatively deep water. Heron-Allen and Earland record it as abundant in the Kerimba Archipelago.

*Quinqueloculina contorta—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 572 | U.S.N.M. | 1 | D5542... | 8 48 30 N.; 122 35 30 E.. | 200 | 54.3 | fne.s.,brk.sh. | Few. |
| 573 | U.S.N.M. | 1 | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s.,glob.,for.. | Few. |
| 574 | U.S.N.M. | 2 | D5565... | 5 51 42 N.; 120 30 30 E.. | 243 | 52.8 | s.,ptr.sh.... | Few. |
| | | | D5571... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.3 | s.,sh........ | Few. |
| 575 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Few. |
| | | | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy.m.,glob.. | Few. |

QUINQUELOCULINA SCULPTURATA, new species.

Plate 91, figs. 3, 4.

*Description.*—Test elongate, chambers with the outer face broadly convex, sides concave, the angle between the peripheral and lateral faces sharp, chambers much the broadest near the initial end, tapering toward the apertural end; peripheral face in the young with deep oblique chambers and ridges, in the later development becoming a coarse reticulation; apertural end very slightly produced, with a single, long tooth.

Length up to 1 mm.

*Quinqueloculina sculpturata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 3626 | U.S.N.M. | 1 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s........ | Rare. |
| 3629 | U.S.N.M. | 1 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s........ | Rare. |
| 3628 | U.S.N.M. | 2 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. sh....... | Rare. |
| 3627 | U.S.N.M. | 2 | D5218... | 18 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Rare. |
| | | | | Jolo Jolo, P. I............ | ...... | ....... | ............ | Rare. |

*Distribution.*—Type specimen (Cat. No. 13626, U. S. N. M.) from *Albatross* station D5143, off Jolo, in 19 fathoms (35 meters). It has also occurred at the two neighboring stations, D5144 and D5145, in 19 and 23 fathoms (35 and 42 meters), and D5218, between Burias and Luzon, in 20 fathoms (37 meters).

This is similar in some respects to one of Heron-Allen and Earland's figures of *Q. kerimbatica.*[42]

Both the young and adult are very different from any of the other reticulate forms of the Philippine material.

### QUINQUELOCULINA RETICULATA (d'Orbigny).

*Triloculina reticulata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 299, No. 9.
*Quinqueloculina reticulata* KARRER, Sitz. Akad. Wiss. Wien, vol. 44, 1861, p. 449, pl. 2, fig. 5.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 55, pl. 16, figs. 1-3
*Miliolina reticulata* PARKER, JONES, and BRADY, Ann. Mag. Nat. Hist., ser. 4, vol. 8, 1871, p. 249, pl. 8, fig. 18.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 177, pl. 9, figs. 2-4.—SCHLUMBERGER, Mém. Soc. Zool. France, vol. 6, 1893, p. 214, text fig. 25, pl. 2, fig. 62.

To this species are referred several specimens, which are found a a number of stations, with periphery and reticulations at the side somewhat like *Q. sagra* d'Orbingy but not bicarinate. A study o the West Indian shallow-water material, together with d'Orbigny' Cuban Monograph, shows that *Q. reticulata* in the West Indies is very definite species and similar in general characters to that referred to here, but not including the various reticulate forms o species which are referred to this name by various authors.

Typical material occurred at 15 stations, ranging in depth from 17 to 303 fathoms (31 to 554 meters), the average being 76 fathoms (139 meters). Bottom temperatures are given at two stations; these are 52.3° F. (11.2° C.), and 53.3° F. (11.8° C.); as both represent the deepest stations in the series, the average for the shallowe water stations would probably bring this up to 75° F. (23.8° C. at least. All but one of the stations are in the Archipelago proper most of them in the Sulu region. It has occurred in the Sulu Archipelago, off Jolo, off Siasi, and off Tawi Tawi; also off northern Cebu between Burias and Luzon; Verde Island Passage; and to the southward in Buton Strait, where it occurred at 24 fathoms (44 meters) showing that the species is probably widely distributed there i shallow-water material were obtainable.

*Quinqueloculina reticulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundanc |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13683 | U.S.N.M. | 1 | D5136... | 6 04 20 N.; 120 59 30 E... | 22 | ....... | s., sh......... | Rare. |
| 13684 | U.S.N.M. | 10+ | D5137... | 6 04 25 N.; 120 58 30 E... | 20 | ....... | s., sh......... | Common. |
| 13685 | U.S.N.M. | 2 | D5141... | 6 09 00 N.; 120 58 00 E... | 29 | ....... | co. s......... | Few. |
| 13686 | U.S.N.M. | 8 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Common. |
| 13687 | U.S.N.M. | 4 | D5146... | 5 46 40 N.; 120 48 50 E... | 24 | ....... | co. s., sh.... | Few. |
| 13688 | U.S.N.M. | 3 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh.... | Few. |
| 13689 | U.S.N.M. | 2 | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Few. |
| 13690 | U.S.N.M. | 4 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wht. s........ | Few. |
| 13691 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| 13692 | U.S.N.M. | 5 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Few. |
| 13693 | U.S.N.M. | 1 | D5269... | 13 39 50 N.; 129 59 30 E... | 220 | ....... | fne. s., p.... | Rare. |
| 13700 | U.S.N.M. | 2 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Rare. |
| 13694 | U.S.N.M. | 2 | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s.............. | Rare. |
| 13695 | U.S.N.M. | 5 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Few. |
| | | | | Tara Island, P. I........ | ....... | ....... | .............. | |

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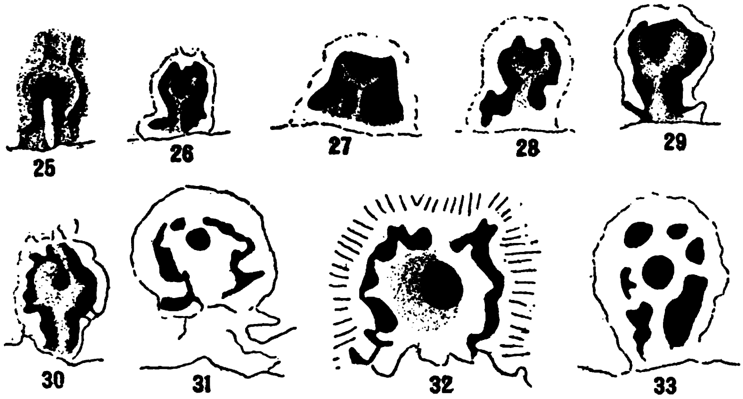
[42] Trans. Zool. Soc., London, vol. 20, 1915, pl. 43, fig. 18

### QUINQUELOCULINA ALBATROSSI, new species.

Plate 85, figs. 4*a–c*.

*Description.*—Test large, quinqueloculine throughout, elongate, oval; in the young the chambers with rounded angles on the periphery, later becoming convexly rounded, ornamentation consisting of very numerous fine reticulations, regularly arranged in the young specimens, the reticulations gradually being limited to the sides of the chambers and the peripheral face becoming smooth, and finally the entire chamber smooth; the reticulations show in places near the inner margin or not at all; aperture rounded slightly, if at all, above the base of the preceding chamber; the margin with a thickened lip, and in the adult a bifid tooth.



FIGS. 25–33.—QUINQUELOCULINA ALBATROSSI, NEW SPECIES. × 50. VARIOUS STAGES IN THE DEVELOPMENT OF THE APERTURAL CHARACTERS. 25, A SIMPLE TOOTH IN A GENERALLY ROUNDED APERTURE. 26–29, A BIFID TOOTH, THE APERTURE GRADUALLY ASSUMING AN IRREGULAR FORM BY THE DEVELOPMENT OF PROCESSES AND REËNTRANTS. 30, ONE ARM OF THE BIFID TOOTH BROADENING, THE OTHER ALREADY JOINED TO THE SIDE OF THE APERTURE. 31, 32, STAGES IN THE BROADENING OF THE TOOTH AFTER THE CENTRAL OPENING IS ENTIRELY SURROUNDED. 33, A LATER STAGE WHERE THE SIDES HAVE FUSED INTO THE PROCESSES LEAVING A CENTRAL APERTURE AND SIX SUPPLEMENTARY ONES ABOUT IT.

Length up to nearly 3 mm.

*Distribution.*—Type specimen (Cat. No. 13877, U. S. N. M.) from *Albatross* station D5133, Sulu Sea, off western Mindanao, 38 fathoms (70 meters).

Specimens have been found in the material from the following general localities: China Sea, off southern Luzon; Sulu Sea, off western Mindanao, near Basilan Island, off Jolo, off Tawi Tawi; off Romblon; off northern Cebu; off western Samar; Gulf of Davao; China Sea, off Formosa; between Cebu and Bohol; between Samar and Leyte; between Negros and Siquijor; Tara Island; and to the south at two stations in Buton Strait.

These stations range in depth from 18 to 500 fathoms (33 to 914 meters), the average 87.8 fathoms. Bottom temperatures are given but for eight stations, ranging from 52.9° F. to 79.5° F. (11.6° C. to

26.3° C.); the average temperature, 63.2° F. (17.3° C.). As these are mostly from the deeper stations, the average temperature would probably be around 75° F. (23.8° C.). Altogether it has occurred at 31 stations, and at many of them abundantly; therefore it is one of the characteristic species of the region. This is one of the fine large species dredged by the *Albatross*, and is abundant in the Philippine Archipelago, and probably in the region southward in shallow water. It is very distinctive at all ages, and can hardly be confused with any other reticulate species, as the very fine sculpture resembling *Spiroloculina elegans* are not so much reticulations as regular lozenge-shaped and elliptical depressions of the surface, in many of the specimens the wall between each series of depressions being as wide as the depressions themselves. The progressive smoothness of the peripheral margin and the retention of the sculpture proximally is just the opposite condition of *Q. kerimbatica*, var. *philippinensis*. Some of the large smooth adults would not be thought related to the reticulate group but for the large series of stages and by cutting back to the earlier chambers.

*Quinqueloculina albatrossi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13871 | U.S.N.M. | 5 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s. sh. | Frequent. |
| 13872 | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s. sh. | Common. |
| 13873 | U.S.N.M. | 10+ | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | ............... | Common. |
| 13874 | U.S.N.M. | 10+ | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Common. |
| 13875 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59.0 | dk. gy. m... | Rare. |
| 13876 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N.; 15° W., 0.30 miles. | 26 | ....... | gn. m., s.... | Abundant. |
| 13877<br>13878 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N.; 52° E., 1.50 miles. | 38 | 79.5 | gn. m., s.... | Common. |
| 13879 | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Few. |
| 13880 | U.S.N.M. | 10+ | D5137... | 6 04 25 N.; 120 58 30 E... | 20 | ....... | s., sh......... | Common. |
| 13881 | U.S.N.M. | 10+ | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ....... | co. s., sh.... | Common. |
| 13882 | U.S.N.M. | 2 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Rare. |
| 13883 | U.S.N.M. | 8 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Frequent. |
| 13884 | U.S.N.M. | 1 | D5147... | 5 41 40 N.; 120 47 10 E... | 21 | ....... | co. s., sh.... | Rare. |
| 13885 | U.S.N.M. | 10+ | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ....... | co. s., sh.... | Common. |
| 13886 | U.S.N.M. | 2 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wht. s........ | Few. |
| 13887 | U.S.N.M. | 4 | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | crs.s., brk.sh. | Few. |
| 13888 | U.S.N.M. | 4 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Few. |
| 13890 | U.S.N.M. | 8 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 13889 | U.S.N.M. | 5 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Few. |
| 13891 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| 13892 | U.S.N.M. | 4 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s.... | Few. |
| 13893 | U.S.N.M. | 10+ | D5250... | 7 05 07 N.; 125 39 45 E... | 23 | ....... | co. s......... | Common. |
| 13894 | U.S.N.M. | 7 | D5265... | 7 08 00 N.; 125 39 00 E... | 100 | ....... | sft. m........ | Few. |
| 13895 | U.S.N.M. | 5 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p. s...... | Few. |
| 13896 | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh......... | Rare. |
| 13897 | U.S.N.M. | 1 | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m........ | Rare. |
| 13898 | U.S.N.M. | 3 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m........ | Few. |
| 13899 | U.S.N.M. | 10+ | D5478... | 10 46 24 N.; 125 16 30 E... | 57 | ....... | sh............. | Common. |
| 13900 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s.... | Rare. |
| 13901 | U.S.N.M. | 10 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh... | Common. |
| 13902 | U.S.N.M. | 3 | D5642... | 4 31 40 S.; 122 49 42 E .. | 37 | ....... | gy. m........ | Few. |
| 13903 | U.S.N.M. | 3 | .......... | Tara Island, P.I.......... | ....... | ....... | ............... | Few. |

**QUINQUELOCULINA KERIMBATICA (Heron-Allen and Earland).**

*Miliolina parkeri* MILLETT, Journ. Roy. Micr. Soc., 1898, p. 507, pl. 12, fig. 4.

*Miliolina kerimbatica* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 574, pl. 43, figs. 13–23.

The following is the original description:

Test free, quinqueloculine. The walls of the chambers thick, irregularly furrowed n all directions with broad, deeply gouged-out channels, running obliquely and irregularly across the face of each chamber and generally connecting with a deeper straight urrow excavated down the peripheral edge. This straight peripheral furrow, when xposed on an earlier chamber in the center of the test by the quinqueloculine rrangement of the shell, affords a very striking appearance by contrast with the ansverse furrows on the surface of the surrounding chambers. Aperture large and rnished with a prominent tooth. The oral end is usually but slightly produced, ut in some individuals the aperture is situated on a produced neck. The ridges between the furrows are flat on the top—i. e., the furrows are cleanly gouged out of he shell substance.

The typical form of this species with irregular, excavate peripheral faces, and with flat-topped ridges, is very rare in the Philippine material, being replaced by varieties showing very constant characters.

The typical form occurred at the following stations: Tara Island, in shallow water, and D5143, in 19 fathoms (35 meters), off Jolo.

The types, of which the above is the original description, were from the Kerimba Archipelago, off southeastern Africa, described by Heron-Allen and Earland.[43]

*Quinqueloculina kerimbatica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 13486 | U.S.N.M. | 1 | D5143... | 6° 05′ 50″ N.; 121° 02′ 15″ E... | 19 | ° F. ...... | co. s......... | Rare. |
| 13485 | U.S.N.M. | 1 | .......... | Tara Island, P. I........ | ...... | ...... | ............ | Rare. |

**QUINQUELOCULINA KERIMBATICA, var. RETICULO-STRIATA, new variety.**

Plate 89, figs. 1*a–c*.

*Description.*—Test with peripheral faces rather squarely truncate and ornamented by longitudinal narrow costae, the sides of the chambers with oblique areolae; the apertural end contracted and terminating in a short cylindrical neck, and thin philaline lip with a bifid tooth.

Length 2 mm.

*Description.*—Type specimen (Cat. No. 13488, U. S. N. M.) from *Albatross* station D5276, in 18 fathoms (33 meters), China Sea, off southern Luzon.

This variety is larger than variety *philippinensis*, and is closer to the typical form of the species; but the peripheral face of the chamber has sharp, usually very even costae, and the sides are reticulated much as in *Q. parkeri*. It is not as common as the following variety, but has occurred at eight stations in the region, ranging in depth from 14 to 260 fathoms (25 to 476 meters).

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[43] Trans. Zool. Soc., London, vol. 20, 1915, p. 574.

The following localities are represented: Malampaya Sound, Palawan Island; Palawan Passage; Sulu Archipelago, off Tawi Tawi; off Jolo; China Sea, off southern Luzon; and one station to the south in Sibuko Bay, Borneo.

*Quinqueloculina kerimbatica*, var. *reticulo-striata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13487 | U.S.N.M. | 1 | D5151... | 5 24 40 N.; 120 27 15 E... | 24 | ....... | co. s., sp..... | Rare. |
| 13488 | U.S.N.M. | 1 | D5210... | 11 40 56 N.; 124 28 06 E... | 50 | 76.3 | fne. gy. s.... | Rare. |
| 13486 | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Common. |
| 13489 | U.S.N.M. | 8 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m... | Common |
| 13490 | U.S.N.M. | 1 | D5339... | 11 22 00 N.; 119 12 00 E... | 52 | ....... | m........... | Rare. |
| 13491 | U.S.N.M. | 2 | D5342... | 10 56 55 N.; 119 17 24 E... | 14–25 | ....... | gy. m....... | Few. |
| 13492 | U.S.N.M. | 2 | D5358... | 6 06 40 N.; 118 18 15 E... | 39 | ....... | m........... | Common. |
| 13494 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 06 E... | 260 | 45.7 | fne. gy. s.,<br>gy. m. | Rare. |

### QUINQUELOCULINA KERIMBATICA, var. PHILIPPINENSIS, new variety.

Plate 89, figs. 2, 3.

*Description.*—Test elongate, quinqueloculine; peripheral margin of the chambers broadly rounded, sides convex, surface ornamented; the peripheral face with regular reticulations with thin walls between, large but very regular, sides either with the reticulate pattern entire, or becoming obsolescent or even wanting, especially in older specimens; apertural end of the chamber projecting and contracted to form an exsert cylindrical neck without ornamentation, with a thin border, not thickened, but with a phialine lip and a simple bifid tooth.

Length seldom exceeding 1 mm.

*Description.*—Type specimen (Cat. No. 13510, U.S.N.M.) from *Albatross* station D5159, Sulu Archipelago, Tawi Tawi Group, in 10 fathoms (18 meters).

It has occurred at numerous stations, all but one in the Philippine Archipelago. There are 32 stations, ranging in depth from 10 to 500 fathoms (18 to 914 meters), the average depth being 62 fathoms (114 meters). Bottom temperatures are given for only two stations—one in 375 fathoms, 56.4° F. (13.5° C.), the other in 50 fathoms (914 meters), 76.3° F. (24.6° C.). Therefore the average, including the various shallow-water stations, would be close to the latter figure. The species is abundant in shallow water and becomes less common as depths increase above 50 fathoms (91 meters).

These stations include the following localities: Tacloban Anchorage; China Sea, off southern Luzon; Sulu Sea, off western Mindanao, near Basilan Island, off Tawi Tawi; off Romblon; off eastern Panay; off northern Cebu; off western Samar; between Burias and Luzon; between Marinduque and Luzon; Palawan Passage; Malampaya Sound, Palawan Island; off eastern Palawan; between Samar and Leyte; and to the south in Buton Strait.

This variety differs from the typical form in the greater regularity of the ornamentation, and in the peripheral margin which is not striate but reticulate. The progressive appearance of the smooth area on the periphery is just the opposite of the development in *Q. albatrossi*.

While there is a considerable variation in the amount of surface covered by the reticulate ornamentation, the form of the test, the produced neck without the reticulations, and the thin phialine lip, all mark it at once in a mixed lot of material, and these characters remain very constant. While here placed as a variety of *Q. kerimbatica*, it may be specifically different. At any rate it appears to replace *Q. kerimbatica* almost entirely in the Philippine region.

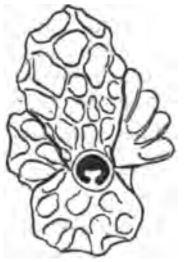

FIG. 34.—QUINQUELOCULINA KERIMBATICA HERON-ALLEN AND EARLAND, VAR. PHILIPPINENSIS, APERTURAL VIEW. × 50, FROM ALBATROSS STATION D5164.

*Quinqueloculina kerimbatica*, var. *philippinensis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13496 | U.S.N.M. | 10+ | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy. m., s.... | Common. |
| 13497 | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. sh. s..... | Common. |
| 13499 | U.S.N.M. | 10+ | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s........ | Common. |
| 13500 | U.S.N.M. | 8 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | ............. | Common. |
| 13502 | U.S.N.M. | 7 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Common. |
| 13503 | U.S.N.M. | 3 | D5113... | 13 51 30 N.; 120 50 30 E... | 159 | ....... | dk. gn. m... | Few. |
| 13504 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Point, N. 15 W°.; 0.30 mile. | 26 | ....... | gn. m., s.... | Common. |
| 13505 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 15° W.; 1.50 miles. | 38 | ....... | gn. m., s.... | Common. |
| 13506 | U.S.N.M. | 10+ | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Common. |
| 13507 | U.S.N.M. | 10+ | D5152... | 5 25 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Common. |
| 13508 | U.S.N.M. | 2 | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh.... | Few. |
| 13509 | U.S.N.M. | 10+ | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh.... | Common. |
| 13510 | U.S.N.M. | 10 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Common. |
| 13511 | U.S.N.M. | 10+ | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s........ | Common. |
| 13512 | U.S.N.M. | 10+ | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m........ | Common. |
| 13498 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Common. |
| 13501 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 13514 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Common. |
| 13515 | U.S.N.M. | 7 | D5210... | 11 49 55 N.; 124 28 06 E... | 50 | 76.3 | fne. gy. s.... | Common. |
| 13517 | U.S.N.M. | 2 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | cr. s......... | Few. |
| 13516 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Common. |
| 13526 | U.S.N.M. | 2 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p.,s..... | Rare. |
| 13518 | U.S.N.M. | 1 | D5336... | 11 37 45 N.; 119 46 00 E... | 46 | ....... | s.,m......... | Rare. |
| 13519 | U.S.N.M. | 2 | D5338... | 11 33 45 N.; 119 24 45 E... | 43 | ....... | co. s., s., m.. | Few. |
| 13520 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m....... | Rare. |
| 13522 | U.S.N.M. | 8 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co. s......... | Common. |
| 13521 | U.S.N.M. | 2 | D5426... | 19 12 00 N.; 118 28 00 E... | 27 | ....... | fne. gy. s.... | Few. |
| 13523 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. (net). | Rare. |
| 13524 | U.S.N.M. | 1 | D5478... | 10 46 24 N.; 125 16 30 E... | 57 | ....... | sh............ | Rare. |
| 13513 | U.S.N.M. | 6 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Few. |
| 13525 | U.S.N.M. | 1 | D5642... | 4 31 40 S.; 122 49 42 E... | 37 | ....... | gy. m....... | Rare. |
| 13495 | U.S.N.M. | 10+ | .......... | Tacloban Anchorage, P. I. | ...... | ....... | ............. | Abundant. |

### QUINQUELOCULINA PARKERI (H. B. Brady).

Plate 86, figs. 4*a–c*.

"*Quinqueloculina* with oblique ridges" PARKER, Trans. Micr. Soc. London, vol. 6, 1858, p. 53, pl. 5, fig. 10.

*Miliolina parkeri* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 46; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 177, pl. 7, fig. 14.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, 1915, vol. 20, p. 574.

*Quinqueloculina parkeri* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 50, pl. 15, fig. 3.

This species, which seems to be a typical one of coral-reef regions, is fairly common in the Philippine area. All 28 stations at which it is recorded are in the Archipelago proper, none of the records being from the regions to the south. This is probably because those stations represent deeper water stations, and it is probably found in shallower water, as recorded by Millett and Chapman. The stations range in depth from 10 to 318 fathoms (18 to 582 meters), with the average depth 45 fathoms (82 meters). Bottom temperatures are given but for three stations, ranging from 52.9° F. to 75.7° F. (11.6° C. to 26.3° C.), the average temperature being 62.3° F. (16.7° C.). As the stations at which bottom temperatures are lacking are mostly those in the shallower water, the average bottom temperature would probably be nearer the maximum given here. From the records the species seems to be commonest in waters less than 30 fathoms (55 meters), and less frequent at depths greater than these. There is some variation, but on the whole the specimens are rather typical in their characters. From the available records this seems to be a species ranging from the Hawaiian Islands on the east to the Kerimba Archipelago and the Red Sea on the west.

*Quinqueloculina parkeri—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 10811 | U.S.N.M. | 8 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ......... | gy. m....... | Common. |
| 10812 | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E... | 10 | ......... | co........... | Rare. |
| 10813 | U.S.N.M. | 1 | D5133... | Island off Panabutan Point N; 52°E., 1.5 miles | 38 | ......... | gn. m., s.... | Rare. |
| 10814 | U.S.N.M. | 2 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ......... | s., sh....... | Rare. |
| 10815 | U.S.N.M. | 4 | D5137... | 6 04 25 N.; 120 58 30 E... | 20 | ......... | s., sh........ | Common. |
| 10816 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ......... | s., Co........ | Few. |
| 10817 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ......... | co. s......... | Rare. |
| 10818 | U.S.N.M. | 4 | D5142... | 6 06 10 N.; 121 02 40 E... | 21 | ......... | co. s., sh.... | Few. |
| 10819 | U.S.N.M. | 5 | D5143... | 6 05 50 N.; 121 02 15 E... | 19 | ......... | co. s......... | Frequent. |
| 10820 | U.S.N.M. | 2 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ......... | co. s......... | Rare. |
| 10821 | U.S.N.M. | 7 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ......... | co. s., sh.... | Frequent. |
| 10822 | U.S.N.M. | 3 | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ......... | co. s......... | Frequent. |
| 10823 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ......... | wht. s........ | Rare. |
| 10824 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ......... | co. s., sh.... | Rare. |
| 10825 | U.S.N.M. | 9 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ......... | co. s......... | Frequent. |
| 10826 | U.S.N.M. | 8 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ......... | co. s......... | Frequent. |
| 10827 | U.S.N.M. | 3 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ......... | s.............. | Rare. |
| 10828 | U.S.N.M. | 3 | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | crs. s., brk. sh | Few. |
| 10829 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ......... | fne. s., sh.... | Rare. |
| 10830 | U.S.N.M. | 4 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ......... | fne. s........ | Few. |
| 10831 | U.S.N.M. | 2 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Few. |
| 10832 | U.S.N.M. | 3 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ......... | gn. s......... | Few. |
| 10833 | U.S.N.M. | 6 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ......... | crs. s........ | Common. |
| 10834 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ......... | sft. gn. m... | Rare. |
| 10835 | U.S.N.M. | 1 | D5278... | 14 00 10 N.; 120 17 15 E... | 102 | 58.6 | fne. s., m., sh. | Rare. |
| 10836 | U.S.N.M. | 1 | .......... | Tara Island.................. | ...... | ......... | .............. | Rare. |
| 10837 | U.S.N.M. | 5 | .......... | Binang Pool, Subin Bay.. | ...... | ......... | .............. | Frequent. |
| 10838 | U.S.N.M. | 2 | .......... | Shell sand from beach, Midway Island. | ...... | ......... | .............. | Frequent. |

### QUINQUELOCULINA AGGLUTINANS d'Orbigny.

Plate 91, figs. 1a–c.

*Quinqueloculina agglutinans* D'ORBIGNY, in De la Sagra, Hist. Fis. Pol. Nat., Cuba, 1839, "Foraminifères," p. 168, pl. 12, figs. 11-13 (not of later authors).

From a study of West Indian material from shallow water and a comparison with d'Orbigny's figures it is clear that the true *Q. agglutinans* is an arenaceous species with a squarish edge to the peripheral portion. A very similar form occurs in the Philippine material at several stations. It is close to the forms assigned by Heron-Allen and Earland to *Q. sclerotica.*

Material of this species occurred at nine stations, ranging in depth from 10 to 88 fathoms (18 to 161 meters), with the average 31 fathoms (57 meters). The only station at which bottom temperatures were given was 75.7° F. (24.2° C.).

These stations are all in and about the Archipelago; China Sea, off southern Luzon; off Jolo; Sulu Archipelago, Tawi Tawi Group; off Romblon; between Burias and Luzon; and Ragay Gulf, Luzon.

*Quinqueloculina agglutinans—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13605 | U.S.N.M. | 10+ | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m....... | Abundant. |
| 13612 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s.......... | Rare. |
| 13609 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Rare. |
| 13635 | U.S.N.M. | 5 | D5156... | 5 12 50 N.; 119 55 55 E... | 18 | ....... | fne. s., sh.... | Frequent. |
| 13606 | U.S.N.M. | 5 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s.......... | Frequent. |
| 13608 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s., blk sp. | Rare. |
| 13610 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Rare. |
| 13611 | U.S.N.M. | 8 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Frequent. |
| 13607 | U.S.N.M. | 1 | D5381... | 13 14 15 N.; 122 44 45 E... | 88 | ....... | co. s.......... | Rare. |

### QUINQUELOCULINA SCLEROTICA Karrer.

*Quinqueloculina sclerotica* KARRER, Sitz. Akad. Wiss. Wien, vol. 43, 1868, Abth. 1, pp. 111-193, pls. 1-5.

*Miliolina sclerotica* BALKWILL and MILLETT, Journ. Micr., vol. 3, 1884, p. 24, pl. 1, fig. 2.—SIDEBOTTOM, Mem. Proc. Lit. Philos. Soc. Manchester, pt. 1, 1904, p. 14.—HERON-ALLEN and EARLAND, Journ. Roy. Micr. Soc., 1911, p. 304; Proc. Roy. Irish Acad., vol. 31, pt. 64, p. 30; Trans. Zool. Soc. London, vol. 20, 1915, p. 577.

To this species are referred numerous specimens from the Philippine dredgings which occur in comparatively shallow water, and which are not the same as *Q. agglutinans* d'Orbigny. I am not sure that this material should be referred to *Q. sclerotica* Karrer. It has occurred at 14 stations, ranging in depth from 10 to 312 fathoms (18 to 571 meters), the average depth being 49 fathoms (90 meters). Bottom temperatures were given at two stations, 49.3° F. and 75.7° F.) (9.6° C. and 24.2° C.); the warmer representing 37 fathoms (68 meters) and the colder 312 fathoms (571 meters). Therefore, as this species occurs in shallow water, the average temperatures would probably be about the maximum given. Heron-Allen and Earland record it from the Kerimba Archipelago, "often abundant and presenting a considerable range of external form." The localities in the Philippine area are as follows: Off Jolo; off Romblon; off Tawi Tawi; between Samar and Leyte; off eastern Panay; off northwestern Panay; China Sea, off southern Luzon; off northern Cebu; Malampaya Sound, Palawan Island; Sulu Archipelago; and between Marinduque and Luzon.

*Quinqueloculina sclerotica—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13594 | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh.... | Rare. |
| 13595 | U.S.N.M. | 2 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Few. |
| 13671 | U.S.N.M. | 6 | D5106... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Few. |
| 13592 | U.S.N.M. | 4 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | .............. | Few. |
| 13593 | U.S.N.M. | 1 | D5136... | 6 04 20 N.; 120 59 20 E... | 22 | ....... | s., sh....... | Rare. |
| 13596 | U.S.N.M. | 6 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Few. |
| 13597 | U.S.N.M. | 1 | D5179... | 12 33 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Rare. |
| 13598 | U.S.N.M. | 10+ | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 13599 | U.S.N.M. | 3 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Few. |
| 13600 | U.S.N.M. | 10+ | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Abundant. |
| 13604 | U.S.N.M. | 4 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob.. | Few. |
| 13601 | U.S.N.M. | 10+ | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Common. |
| 13602 | U.S.N.M. | 4 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m........ | Few. |
| 13603 | U.S.N.M. | 4 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Few. |

### QUINQUELOCULINA FUSCA Brady.

Plate 84, figs. 6*a*–*c*.

*Quinqueloculina fusca* BRADY, Ann. Mag. Nat. Hist., 1870, p. 286, pl. 2, fig. 2.
*Miliolina fusca* BRADY, Journ. Roy. Micr. Soc., London, 1887, p. 883.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 576.

There are specimens which have the characteristic reddish color, reminding one of the color of many *Astrorhizidae* and *Lituolidae*. These occurred at six stations, ranging in depth from 20 to 159 fathoms (37 to 291 meters), the average depth being 92 fathoms (169 meters).

These stations include the following localities: Tara Island, off Romblon; China Sea, off Hongkong; Malampaya Sound, Palawan Island; off Marinduque Island; and to the southward in Buton Strait.

Heron-Allen and Earland record this species from the Kerimba Archipelago as "very sparingly distributed."

Specimens were frequent off Tara Island and common off Hongkong, but less common at the other stations.

*Quinqueloculina fusca—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13613 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s....... | Few. |
| 13614 | U.S.N.M. | 6 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh.... | Common. |
| 13615 | U.S.N.M. | 4 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-26 | ....... | gy. m....... | Frequent. |
| 13616 | U.S.N.M. | 1 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.3 | sft. m....... | Rare. |
| 13617 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh.... | Rare. |
| 13618 | U.S.N.M. | 3 | .......... | Tara Island, P. I........ | ....... | ....... | ............. | Frequent. |

### QUINQUELOCULINA CRASSATINA (H. B. Brady).

Plate 84, figs. 4*a–c*.

*Miliolina incrassata* H. B. Brady, Quart. Journ. Micr. Soc., vol. 21, 1881, p. 46.
*Miliolina crassatina* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 180, pl. 8, figs. 5*a*, *b*.

Brady described this species from off East Moncoeur Island, Bass Strait, in 138 fathoms (252 meters). It is evidently a rare species and possibly limited to the Pacific region.

Specimens very similar to that figured by Brady have occurred at two stations—D5178, off Romblon, in 78 fathoms (143 meters), and D5640, Buton Strait, in 24 fathoms (44 meters). Bottom temperatures are not given in either case.

*Quinqueloculina crassatina—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13619 | U.S.N.M. | 2 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s....... | Rare. |
| 13620 | U.S.N.M. | 1 | D5640... | 4 27 00 S.; 122 55 40 E... | 24 | ....... | s., brk. sh.... | Rare. |

### QUINQUELOCULINA ALVEOLINIFORMIS (H. B. Brady).

*Miliolina alveoliniformis* H. B. Brady, Quart. Journ. Micr. Soc., vol. 19, 1879; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 181, pl. 8, figs. 15–20.—Egger, Abh. kön. bay. Akad. Wiss. München, Cl. II, vol. 18, 1893, p. 232, pl. 2, figs. 17–19.—Millett, Journ. Roy. Micr. Soc., 1898, p. 510.—Chapman, Journ. Linn. Soc. Zoology, vol. 28, 1901, p. 177; vol. 30, 1910, p. 398.—Heron-Allen and Earland, Trans. Zool. Soc., vol. 20, 1915, p. 581.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 43.

The records for this species are from the Indo-Pacific, mostly in shallow water. In the Philippines there are 10 records from stations ranging from 10 to 375 fathoms (18 to 686 meters), with the average 60 fathoms (110 meters). The two stations at which it was really common are in 10 and 20 fathoms (18 and 37 meters). The bottom temperature of the two stations given are 56.4° F. and 75° F. (13.5° C.

and 23.8° C.), but the lower of these is from the deepest station, 375 fathoms (686 meters), where the specimen was evidently accidental, and the next deepest one 37 fathoms (68 meters). All the other stations are in still shallower water, with consequent higher bottom temperatures.

The most of the stations are from the shallow water about the Sulu Sea, with a few other localities scattered about the Archipelago. It was not found in the region to the southward, largely on account of the deeper water in which the dredgings in that area were made.

*Quinqueloculina alveoliniformis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13073 | U.S.N.M. | 3 | | Apra Bay, Guam | | | | Few |
| 13673 | U.S.N.M. | 3 | D5134 | 6 44 45 N.; 121 48 00 E. | 25 | | fne. s. | Few. |
| 13676 | U.S.N.M. | 3 | D5154 | 5 14 50 N.; 119 58 45 E. | 12 | | co. s. | Few. |
| 13672 | U.S.N.M. | 10+ | D5159 | 5 11 50 N.; 119 54 00 E. | 10 | | co. s. | Abundant. |
| 13674 | U.S.N.M. | 2 | D5160 | 5 12 40 N.; 119 55 10 E. | 12 | | s. | Few. |
| 13675 | U.S.N.M. | 3 | D5179 | 12 38 15 N.; 122 12 30 E. | 37 | 75.7 | hrd. s. | Few. |
| 13677 | U.S.N.M. | 1 | D5192 | 11 09 15 N.; 123 50 00 E. | 32 | | gn. s. | Rare. |
| 13678 | U.S.N.M. | 8 | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s | Common. |
| 13679 | U.S.N.M. | 3 | D5276 | 13 49 15 N.; 120 14 45 E. | 18 | | sh., p., s. | Few. |
| 13680 | U.S.N.M. | 2 | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co. s. | Few. |
| 13681 | U.S.N.M. | 10+ | | Apra Bay, Guam | | | | Abundant. |
| 13682 | U.S.N.M. | 1 | | Jolo Jolo, P. I. | | | | Rare. |

## Genus MASSILINA Schlumberger, 1893.

This genus includes species in which the early development is quinqueloculine, the later development becoming very much like Spiroloculina.

To this genus are referred those species whose early development is typical quinqueloculine, some of which have been previously referred to *Spiroloculina*.

### MASSILINA SECANS, var. RETICULATA Heron-Allen and Earland.

*Massilina secans*, var. *reticulata* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 582, pl. 45, figs. 1–4.

Specimens which have the general characters of this variety described by Heron-Allen and Earland from the Kerimba Archipelago, were obtained at seven stations, ranging in depth from 10 to 88 fathoms (18 to 161 meters), the average being 30. 1 fathoms (55 meters). Bottom temperatures were not given for one of these stations, but would probably be high in such shallow water.

The stations which include it are as follows: Sulu Archipelago, Tawi Tawi, Jolo, and off western Mindanao; China Sea, off southern Luzon; Ragay Gulf, Luzon; and Tacloban Anchorage.

*Massilina secans*, var. *reticulata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13739 | U.S.N.M. | 1 | D5109... | 14 03 45 N.; 120 16 30 E.. | 10 | ....... | Co.......... | Rare. |
| 13740 | U.S.N.M. | 1 | D5133... | Island off Panabutan Point, N.52°; E.1.50 miles | 38 | ....... | gn. m., s.... | Rare. |
| 13741 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E.. | 19 | ....... | s., Co........ | Rare. |
| 13738 | U.S.N.M. | 1 | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s......... | Rare. |
| 13736 | U.S.N.M. | 2 | D5161... | 5 10 15 N.; 119 53 00 E.. | 16 | ....... | fne. s., blk. sp. | Rare. |
| 13737 | U.S.N.M. | 2 | D5381... | 13 14 15 N.; 122 44 45 E.. | 88 | ....... | co. s......... | Rare. |
| 13743 | U.S.N.M. | 1 | .......... | Tacloban Anchorage, P. I. | ....... | ....... | .............. | Rare. |

### MASSILINA SECANS, var. TENUISTRIATA Heron-Allen and Earland.

*Massilina secans*, var. *tenuistriata* HERON-ALLEN and EARLAND, Trans. Zool. Soc., London, vol. 20, 1915, p. 582, pl. 44, figs. 28–31.

A few specimens from the *Albatross* station D5465, east coast of Luzon, in 500 fathoms (914 meters), probably represent this variety described by Heron-Allen and Earland from the Kerimba Archipelago.

*Massilina secans*, var. *tenuistriata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13742 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E.. | 500 | ....... | gy. m. (m. b.) | Rare. |

### MASSILINA CRENATA (Karrer).

*Spiroloculina crenata* KARRER, Sitz. Akad. Wiss. Wien, vol. 57, 1868, p. 135, pl. 1, fig. 9.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 156, pl. 10, figs. 24–26.—MILLETT, Journ. Roy. Micr. Soc., 1898, p. 265.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 557, pl. 41, fig. 68.

*Massilina crenata* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 57, pl. 20, fig. 2.

Specimens are rare in the Philippine material, due perhaps to the comparative coarseness of many of the available samples.

It has occurred rarely in the following localities: Sulu Archipelago, off Jolo, off Tawi Tawi; two stations off Romblon; and the Pacific Ocean, off the east coast of Mindanao.

These stations range in depth from 23 to 249 fathoms (42 to 458 meters).

It is recorded from the Malay Archipelago by Millett, and from the Kerimba Archipelago by Heron-Allen and Earland. All but one of Brady's records are from the Indo-Pacific.

Heron-Allen and Earland figure specimens which, although larger than the spiroloculine form, do not show that stage, and suggest that these may be the microspheric form, which, growing larger, does not show the adult characters.

*Massilina crenata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13727 | U.S.N.M. | 1 | D5144... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh..... | Rare. |
| 13728 | U.S.N.M. | 2 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s........ | Rare. |
| 13729 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Rare. |
| 13730 | U.S.N.M. | 2 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Rare. |
| 13731 | U.S.N.M. | 1 | D5237... | 8 09 06 N.; 126 31 45 E... | 249 | 46.4 | gn. m........ | Rare. |

### MASSILINA DURRANDII Millett.

Plate 94, figs. 4*a*–*c*.

*Miliolina durrandii* Millett, Journ. Roy. Micr. Soc., 1898, p. 268, pl. 6, figs. 7-10.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 565, pl. 42, figs. 11-16.

This species was originally described by Millett from the Malay Archipelago, and is recorded by Heron-Allen and Earland from the Kerimba Archipelago, where it is "generally distributed and often quite common." They also record it from the coasts of Burmah, Queensland, Java, and Macassar, as well as from Tahiti. It therefore has a widespread tropical distribution in the Indo-Pacific in shallow water.

The few Philippine specimens are all of 50 fathoms (91 meters) of water or less, including the following stations: Tacloban Anchorage; China Sea, off southern Luzon; off eastern Panay; and between Marinduque and Luzon.

*Massilina durrandii*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13732 | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Rare. |
| 13733 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Rare. |
| 13734 | U.S.N.M. | 1 | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Rare. |
| 13735 | U.S.N.M. | 1 | .......... | Tacloban Anchorage, P. I. | ....... | ....... | .............. | Rare. |

### MASSILINA ARENARIA (H. B. Brady).

Plate 94, figs. 3*a*–*b*.

*Spiroloculina arenaria* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 153, pl. 8, fig. 12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 36.

*Massilina arenaria* Dakin, Ceylon Pearl-Oyster Fisheries Suppl. Rep., pt. 5, 1906, p. 231.

From large series dredged at several stations, showing the young of this species, it is evident that it is a species of *Massilina*, instead of *Spiroloculina*. The finely granular condition of the surface is very characteristic, obscuring the sutural lines. This is as characteristic of the early quinqueloculine stage as of the adult. One of Brady's original stations for this species was from the Philippines, in 95 fathoms (174 meters). The others were off Kandavu, Fiji Islands, in 210 fathoms (384 meters), and off Raine Island, Torres Strait, in 185 fathoms (338 meters). Dakin records this from off Ceylon.

At station D5236 there is a very large elongate form, which may possibly be the microspheric form of this species. In the Philippine material this species has occurred at 31 stations, ranging in depth from 14 to 569 fathoms (25 to 1,040 meters); bottom temperatures range from 40.1° F. to 76.3° F. (14.5° C. to 24.6° C.).

Besides the stations scattered through the Archipelago, it has occurred in the regions to the south in Sibuko Bay, Borneo, Gulf of Boni, and south of Patiente Strait.

*Massilina arenaria—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14600 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 59.0 | dk. gy. m.... | Rare. |
| 14601 | U.S.N.M. | 6 | D5132... | Island off Panabutan Point, N.; 15° W., 0.3 mile. | 26 | ....... | gn. m., s..... | Common. |
| 14602 | U.S.N.M. | 10 | D5133... | Island off Panabutan Point, N.; 52° E., 1.5 miles. | 38 | ....... | gn. m., s..... | Common. |
| 14603 | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Few. |
| 14604 | U.S.N.M. | 10 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Common. |
| 14605 | U.S.N.M. | 10+ | D5210... | 11 49 55 N.; 124 28 05 E.. | 50 | 76.3 | fne. gy. s.... | Common. |
| 14606 | U.S.N.M. | 7 | D5213... | 12 15 00 N.; 123 57 30 E.. | 80 | ....... | s., m., sh..... | Common. |
| 14607 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m. ...... | Rare. |
| 14608 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Common. |
| 14609 | U.S.N.M. | 1 | D5247... | 7 02 00 N.; 125 38 45 E.. | 135 | ....... | m........... | Rare. |
| 14610 | U.S.N.M. | 1 | D5261... | 12 30 55 N.; 121 34 24 E.. | 145 | ....... | s., m......... | Rare. |
| 14611 | U.S.N.M. | 10+ | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p......... | Common. |
| 14612 | U.S.N.M. | 2 | D5269... | 13 39 50 N.; 120 59 30 E.. | 220 | ....... | fne. s., p.... | Rare. |
| 14613 | U.S.N.M. | 10 | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Common. |
| 14614 | U.S.N.M. | 1 | D5281... | 13 52 45 N.; 120 25 00 E.. | 201 | 50.4 | dk. gy. s..... | Rare. |
| 14615 | U.S.N.M. | 2 | D5282... | 13 53 00 N.; 120 26 45 E.. | 248 | 47.4 | dk. dy. s.... | Rare. |
| 14616 | U.S.N.M. | 6 | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Rare. |
| 14617 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | fne. co., s., m. | Common. |
| 14618 | U.S.N.M. | 9 | D5342... | 10 56.55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m........ | Common. |
| 14619 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Rare. |
| 14620 | U.S.N.M. | 1 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m........... | Rare. |
| 14621 | U.S.N.M. | 1 | D5424... | 9 37 05 N.; 121 12 37 E.. | 340 | 50.4 | g., s......... | Rare. |
| 14622 | U.S.N.M. | 2 | D5469... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m. (net). | Rare. |
| 14623 | U.S.N.M. | 1 | D5548... | 6 00 20 N.; 120 45 35 E.. | 232 | 53.5 | s., brk., sh... | Rare. |
| 14624 | U.S.N.M. | 6 | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for.. | Rare. |
| 14625 | U.S.N.M. | 1 | D5565... | 5 41 42 N.; 120 30 30 E.. | 243 | 53.8 | s., ptr., sh.... | Rare. |
| 14626 | U.S.N.M. | 2 | D4585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m........ | Rare. |
| 14627 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m........ | Rare. |
| 14628 | U.S.N.M. | 10+ | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Common. |
| 14629 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E... | 569 | ....... | co. s., m...... | Rare. |
| 14630 | U.S.N.M. | 5 | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Common. |

### MASSILINA ASPERULA (Karrer).

*Spiroloculina asperula* KARRER, Sitz. Akad. Wiss. Wien, vol. 57, 1868, p. 136, pl. 1, fig. 10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 152, pl. 8, figs. 13,14 (11?).

Brady's records for this species include one station in the Philippines, in 95 fathoms (174 meters); also off the Admiralty Islands, 68 to 125 fathoms (125 to 229 meters), Ki Islands, 129 fathoms (236 meters), and Humboldt Bay, New Guinea, 37 fathoms (68 meters).

Specimens much like those figured by Brady occur at three Philippine stations—D5178, off Romblon, 78 fathoms (143 meters), D5220, between Marinduque and Luzon, 50 fathoms (91 meters), and D5348, Palawan Passage, 375 fathoms (686 meters).

These seem to be the smaller megalospheric form of this species.

*Massilina asperula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s. ........ | Rare. |
| 13744 | U.S.N.M. | 1 | D5220... | 13 33 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Rare. |
| 13745 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s......... | Rare. |

### Genus ARTICULINA d'Orbigny, 1826.

#### ARTICULINA SAGRA d'Orbigny.

*Articulina sagra* D'ORBIGNY, in De La Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 160, pl. 9, figs. 23–26.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 184, pl. 12, figs. 22–24.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 585, pl. 45, figs. 22–25.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 59, pl. 22, figs. 7, 8.

The only record for this species in the Philippine material is *Albatross* station D5311, China Sea, off Hongkong, in 88 fathoms (161 meters). This consists of the usual early chambers, with a single nodosarian one.

It is recorded by Millett from the Malay region, and it seems strange that it is not more frequent in the Philippine dredgings.

*Articulina sagra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13582 | U.S.N.M. | 1 | D5311... | 21 23 00 N.; 116 15 00 E.. | 88 | ....... | crs. s., sh.... | Rare. |

### Genus SIGMOILINA Schlumberger, 1887.

#### SIGMOILINA SIGMOIDEA (H. B. Brady).

*Planispirina sigmoidea* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 197, pl. 2, figs. 1–3, woodcut fig. 5c.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 10.

*Sigmoilina sigmoidea* CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 317.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 61, pl. 24, figs. 2, 3.

All the records for this species in the *Albatross* Philippine material are from stations in and about the Archipelago, none having occurred in the region to the southward. At the 12 stations recorded the depths range from 218 to 554 fathoms (399 to 1,012 meters), with the average 372 fathoms (681 meters). Bottom temperatures of the nine stations given range from 41.2° F. to 56.4° F. (15.1° C. to 13.5° C.), the average being 50.4° F. (10.2° C.).

The localities include the following: Off Jolo; Sogod Bay, southern Leyte; east of Masbate; Pacific Ocean, east coast of Mindanao; China Sea, off southern Luzon; east coast of Luzon; Palawan Passage; northern Mindanao and vicinity; north of Tawi Tawi; and Sulu Sea, off western Mindanao.

*Sigmoilina sigmoidea—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14687 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ...... | fne.s.,sh.... | Rare. |
| 14688 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Rare. |
| 14689 | U.S.N.M. | 2 | D5214... | 12 26 18 N.; 123 37 15 E... | 218 | 51.4 | gn.m........ | Rare. |
| 14690 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne.gy.s..... | Few. |
| 14691 | U.S.N.M. | 1 | D5284... | 13 42 06 N.; 120 30 45 E... | 422 | 42.3 | gy.m.,glob.. | Rare. |
| 14692 | U.S.N.M. | 3 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co.,s ....... | Few. |
| 14693 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ...... | gn.m........ | Rare. |
| 14694 | U.S.N.M. | 2 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy.m.,fne.s. | Rare. |
| 14695 | U.S.N.M. | 1 | D5549... | 6 01 15 N.; 120 44 20 E... | 263 | 52.3 | s.,glob.,f.... | Rare. |
| 14696 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne.s.,glob.. | Rare. |
| 14697 | U.S.N.M. | 2 | D5572... | 5 31 26 N.; 120 09 45 E... | 334 | 52.3 | s............ | Few. |
| 14698 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E... | 221 | ...... | gy.m.,glob.. | Rare. |

### SIGMOILINA SCHLUMBERGERI Silvestri.

*Planispirina celata* H. B. BRADY (not Costa), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 197, pl. 8, figs. 1-4.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 10.

*Sigmoilina celata* CUSHMAN (not Costa), Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 61, pl. 24, fig. 1.

*Sigmoilina schlumbergeri* SILVESTRI, Mem. dell. Pont. Acc. Nuovi-Lincei, vol. 22, 1904, p. 267.—CHAPMAN, Biol. Res. *Endeavour*, vol. 3, pt. 1, 1915, p. 317.

This is one of the common species of the region, especially in water of some depth. It is recorded at 38 *Albatross* stations in the Archipelago and the region to the southward. The depths of the stations range from 32 to 1,570 fathoms (59 to 2,871 meters), with the average 425 fathoms (781 meters). Bottom temperatures range from 39.2° F. to 64.5° F. (4° C. to 18° C.), with the average 50.2° F. (10.1° C.).

The 31 stations in the Archipelago are well scattered and in addition it is found to the southward in Sibuko Bay, Borneo; Gulf of Tomini, Celebes; Pitt Passage; Molucca Sea; Gulf of Boni; Flores Sea; and Macassar Strait.

It is a widely distributed species at moderate depths.

*Sigmoilina schlumbergeri*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14701 | U.S.N.M. | 2 | D5120... | 13 45 30 N.; 120 30 15 E... | 393 | 43.7 | gn. m., s..... | Few. |
| 14702 | U.S.N.M. | 1 | D5122... | 13 21 30 N.; 120 30 33 E... | 220 | ....... | gn. m........ | Rare. |
| 14703 | U.S.N.M. | 1 | D5185... | 10 05 45 N.; 122 18 30 E... | 638 | 49.8 | gn. m........ | Rare. |
| 14704 | U.S.N.M. | 10+ | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Common. |
| 14705 | U.S.N.M. | 2 | D5206... | 11 31 40 N.; 124 42 40 E... | 32 | ....... | gn. m........ | Few. |
| 14706 | U.S.N.M. | 1 | D5211... | 11 51 35 N.; 124 14 00 E... | 155 | 56.8 | gn. m., s..... | Rare. |
| 14707 | U.S.N.M. | 2 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m........ | Frequent. |
| 14708 | U.S.N.M. | 1 | D5219... | 13 21 00 N.; 122 18 45 E... | 530 | 50.8 | gn. m........ | Rare. |
| 14709 | U.S.N.M. | 1 | D5227... | 12 53 45 N.; 121 52 30 E... | 322 | ....... | gn. m........ | Rare. |
| 14710 | U.S.N.M. | 9 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Common. |
| 14711 | U.S.N.M. | 10+ | D5242... | 6 51 53 N.; 126 14 10 E... | 191 | 64.1 | sft. gy. m..... | Common. |
| 14712 | U.S.N.M. | 10+ | D5243... | 6 50 55 N.; 126 14 35 E... | 218 | 63.6 | gy. m........ | Common. |
| 14713 | U.S.N.M. | 10+ | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob.. | Common. |
| 14714 | U.S.N.M. | 2 | D5260... | 12 25 35 N.; 121 31 35 E... | 234 | 51.4 | gn. m., s..... | Rare. |
| 14715 | U.S.N.M. | 6 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 53.6 | fne. s........ | Common. |
| 14716 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co..... | Few. |
| 14717 | U.S.N.M. | 1 | D5349... | 10 54 00 N.; 118 26 20 E... | 730 | 40.6 | Co., s........ | Few. |
| 14718 | U.S.N.M. | 1 | D5410... | 10 28 45 N.; 124 05 30 E... | 385 | ....... | gn. m........ | Rare. |
| 14719 | U.S.N.M. | 2 | D5423... | 9 38 30 N.; 121 11 00 E... | 508 | 49.8 | gy. m., co. s.. | Rare. |
| 14720 | U.S.N.M. | 4 | D5430... | 9 49 40 N.; 119 03 20 E... | 464 | 56.0 | glob. oz....... | Few. |
| 14721 | U.S.N.M. | 3 | D5438... | 15 54 42 N.; 119 44 42 E... | 297 | 46.2 | gn. m........ | Few. |
| 14722 | U.S.N.M. | 7 | D5445... | 12 44 42 N.; 124 59 50 E... | 383 | 44.3 | gn. m., s..... | Frequent. |
| 14723 | U.S.N.M. | 2 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s. | Few. |
| 14724 | U.S.N.M. | 3 | D5523... | 8 48 44 N.; 127 23 35 E... | ....... | ....... | ........... | Few. |
| 14725 | U.S.N.M. | 4 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob.. | Few. |
| 14726 | U.S.N.M. | 2 | D5537... | 9 11 00 N.; 123 23 00 E... | 254 | 53.5 | gn. m........ | Few. |
| 14727 | U.S.N.M. | 1 | D5538... | 9 08 15 N.; 123 23 20 E... | 256 | 53.3 | gn. m., s..... | Rare. |
| 14728 | U.S.N.M. | 1 | D5542... | 8 48 30 N.; 123 35 30 E... | 200 | 54.3 | fne. s., brk. sh. | Rare. |
| 14729 | U.S.N.M. | 2 | D5543... | 8 47 15 N.; 123 35 00 E... | 162 | 64.5 | s............ | Rare. |
| 14730 | U.S.N.M. | 10+ | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s..... | Common. |
| 14731 | U.S.N.M. | 1 | D5612... | 0 38 00 S.; 121 45 40 E... | 750 | ....... | ........... | Rare. |
| 14732 | U.S.N.M. | 1 | D5636... | 1 55 00 S.; 127 42 30 E... | 1,262 | ....... | gy. m., fne. s. | Rare. |
| 14733 | U.S.N.M. | 2 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m........ | Rare. |
| 14734 | U.S.N.M. | 1 | D5652... | 4 53 00 S.; 121 23 06 E... | 525 | 41.2 | gn. m........ | Rare. |
| 14735 | U.S.N.M. | 1 | D5660... | 5 36 30 S.; 120 49 00 E... | 692 | 39.2 | gy. m., s..... | Rare. |
| 14736 | U.S.N.M. | 9 | D5666... | 2 54 30 S.; 118 47 00 E... | 272 | 47.5 | gn. m........ | Common |
| 14699 | U.S.N.M. | 2 | D4897... | 7 46 00 S.; 122 00 00 E... | 1,570 | ....... | gy. m., glob.. | Few. |
| 14700 | U.S.N.M. | 1 | H4898... | 7 43 45 S.; 122 03 45 E... | 221 | ....... | gy. m., glob.. | Rare. |

## Genus HAUERINA d'Orbigny, 1846.

### HAUERINA BRADYI Cushman.

*Hauerina compressa* H. B. Brady (not *H. compressa* d'Orbigny) Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 190, pl. 11, figs. 12, 13.—Millett, Journ. Roy. Micr. Soc., 1898, p. 610, pl. 13, fig. 11.—Rhumbler, Zool. Jahrb., Abt. Syst., vol. 24, 1906, p. 52, pl. 3, fig. 39.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 588.

*Hauerina bradyi* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 62, pl. 23, fig. 2.

As far as the material shows this is a very rare species in the region.

Records of its occurrence are from but two stations, D5161, Sulu Archipelago, off Tawi Tawi, in 16 fathoms (29 meters), and D5218, between Burias and Luzon, in 20 fathoms (37 meters). The species was not common at either station.

The species is of the form which I have separated[44] from d'Orbigny's *H. compressa*. Heron-Allen and Earland have the species from the Kerimba region, and note that the form figured by Brady which I have separated is different from some of the other material. The Kerimba specimens seem to be different from those figured by Brady, according to Heron-Allen and Earland. However, they note that the specimens "have walls, all of such extreme tenuity that they are of a delicate blue, opalescent tint." This is also characteristic of the Philippine specimens, which are very delicately colored in a similar way.

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[44] Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 62.

The available records for this species range from the Hawaiian Islands to the coast of Africa and to the Mediterranean.

*Hauerina bradyi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 1579 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 58 08 E... | 16 | ....... | fne.s.,blk.sp. | Rare. |
| 1580 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Few. |

## HAUERINA FRAGILISSIMA (H. B. Brady).

*Spiroloculina fragilissima* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 149, pl. 9, figs. 12-14.

*Hauerina fragilissima* MILLETT, Journ. Roy. Micr. Soc., 1898, p. 610, pl. 13, figs. 8-10.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 587, pl. 46, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 64, pl. 24, fig. 4.

Specimens were not common, being found at but two stations, D5181, off eastern Panay, in 26 fathoms (48 meters), and D5218, between Burias and Luzon, in 20 fathoms (37 meters).

The records for this species seem to be all from the Indo-Pacific region, being recorded by Brady from off Tahiti in 420 and 620 fathoms (768 and 1,134 meters); off Kandavu, Fiji Islands, in 225 fathoms (412 meters); and several stations off New Guinea in 3 to 25 fathoms (5 to 46 meters). He records it as "a rare coral-reef species." The other records are Millett's, from the Malay region, and my own, from the Hawaiian Islands. Dakin records a single specimen from off Ceylon. Heron-Allen and Earland report occasional specimens from the Kerimba region.

*Hauerina fragilissima—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13576 | U.S.N.M. | 1 | D5181... | 11 36 40 N.; 123 26 36 E... | 26 | ....... | m., fne. s.... | Rare. |
| 13577 | U.S.N.M. | 3 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s........ | Frequent. |

### HAUERINA ORNATISSIMA (Karrer).

*Quinqueloculina ornatissima* Karrer, Sitz. Akad. Wiss. Wien, vol. 58, 1868, p. 151, pl. 3, fig. 2.—H. B. Brady, Quart. Journ. Micr. Sci., vol. 16, 1876, p. 406.

*Hauerina ornatissima* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 192, pl. 7, figs. 15–22.—Millett, Journ. Roy. Micr. Soc., 1898, p. 610.—Rhumbler, Zool. Jahrb., Abt. Syst., vol. 24, 1906, p. 53.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 590.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 63, pl. 23, figs. 1, 5.

This species has occurred in the material from but one station, D5178, off Point Origon, Romblon, in 78 fathoms (143 meters).

I can not explain its absence in so much material that should, it seems, be just the habitat for this tropical Indo-Pacific species.

Millett records it from the Malay region, Chapman has had it from Funafuti, Dakin records it from off Ceylon, and Heron-Allen and Earland record it from the Kerimba region.

*Hauerina ornatissima—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 13578 | U.S.N.M. | 1 | D5178... | 12° 42′ 00″ N.; 122° 06′ 15″ E... | 78 | °F.<br>...... | fne. s........ | Rare. |

## Genus TRILOCULINA d'Orbigny, 1826.

### TRILOCULINA TRIGONULA (Lamarck).

*Miliolites trigonula* Lamarck, Ann. du Mus., vol. 5, 1804, p. 351, No. 3.

*Triloculina triognula* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 299, No. 1, pl. 16, figs. 5–9; Modèles, 1826, No. 93.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 65, pl. 25, fig. 3.

*Miliolina trigonula* Williamson, Recent Foraminifera of Great Britain, 1858, p. 83, pl. 7, figs. 180–182.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 164, pl. 3, figs. 14–16.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 561.

This species is not abundant in this area, compared to that of *T. tricarinata*.

There are records from but seven stations, ranging in depth from 12 to 318 fathoms (22 to 582 meters), the average depth being 98 fathoms (179 meters).

These include the following localities: Sulu Archipelago, off Siasi, off Jolo, off Tawi Tawi; between Bohol and Leyte; between Masbate and Leyte; between Burias and Luzon; and China Sea, off Hongkong.

Specimens are common at but one of these stations—D5218, between Burias and Luzon, in 20 fathoms (37 meters).

*Triloculina trigonula*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14680 | U.S.N.M. | 1 | D5148... | 5 35 45 N.; 120 47 30 E.. | 17 | ...... | co. s.......... | Rare. |
| 14685 | U.S.N.M. | 6 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ...... | crs. s......... | Common. |
| 14681 | U.S.N.M. | 1 | D5230... | 10 01 50 N.; 124 42 30 E.. | 118 | 57.6 | gy. s......... | Rare. |
| 14684 | U.S.N.M. | 3 | D5311... | 21 33 00 N.; 116 15 00 E.. | 88 | ...... | crs. s., sh.... | Rare. |
| 14682 | U.S.N.M. | 1 | D5398... | 11 35 12 N.; 124 13 48 E.. | 114 | ...... | gn. m......... | Rare. |
| 14686 | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ...... | co. s.......... | Rare. |
| 14683 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E.. | 318 | ...... | fne. s., sh.... | Rare. |

TRILOCULINA TRIGONULA (Lamarck), var. MULTISTRIATA, new variety.

*Description.*—Variety differing from the typical in having the surface of the test with many fine striae.

*Distribution.*—Type specimen (Cat. No. 13810, U.S.N.M.) from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters).

This form has occurred only at this station. It seems to represent a modified form of this species.

*Triloculina trigonula*, var. *multistriata*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13810 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Rare. |

TRILOCULINA ADVENA, new species.

*Description.*—Test large, triangular, angles bluntly rounded, sides slightly inflated; sutures distinct, surface smooth; aperture very elongate, narrow, crescentiform, without a neck; tooth single, narrow, plate-like, nearly filling but not rising above the rim of the aperture.

Length of largest specimen about 2 mm.

*Distribution.*—Type specimen (Cat. No. 13796, U.S.N.M.) from *Albatross* station D5438, west coast of Luzon, in 297 fathoms (543 meters). Other records of this species are: D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters); D5331, off western Luzon, 178 fathoms (329 meters); and D5572, north of Tawi Tawi, in 334 fathoms (611 meters). Bottom temperatures of these stations range from 41.2° F. to 54.7° F. (5.1° C. to 12.5° C.).

This differs from *Triloculina trigonula* in its aperture, which is very elongate, and filled with a narrow thin lip. It is apparently rather rare, being found at but four stations. The correlation of apertural characters and form of test with rounded angles is very constant.

*Triloculina advena—Material examined.*

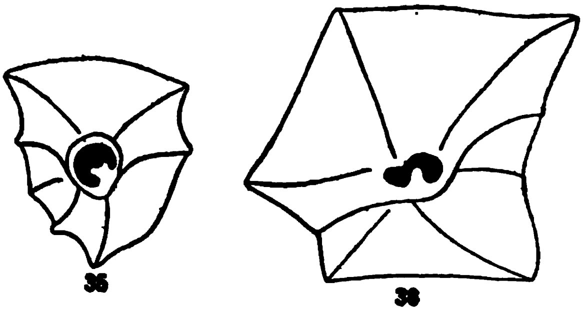
| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13797 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s..... | Few. |
| 13798 | U.S.N.M. | 1 | D5331 .. | 15 36 45 N.; 119 47 45 E.. | 178 | 54.7 | s., sh., m..... | Rare. |
| 13796 | U.S.N.M. | 3 | D5438... | 15 54 42 N.; 119 44 42 E.. | 297 | 46.2 | gn. m........ | Few. |
| 13799 | U.S.N.M. | 1 | D5572... | 5 31 26 N.; 120 00 45 E.. | 334 | 54.3 | s............ | Rare. |

## TRILOCULINA TRICARINATA d'Orbigny.

*Triloculina tricarinata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 299, No. 7.—H. B. BRADY, Trans. Linn. Soc. London, vol. 24, 1864, p. 446, pl. 48, fig. 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 66, pl. 25, figs. 1, 2.

*Miliolina tricarinata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 165, pl. 3, fig. 17*a*, *b*.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 7.

This species is typical and very common in the area. There are two distinct varities, one elongate and very rare, and the other shorter and very common. The sides are usually concave in the larger species and the aperture often cruciform. In the young there are two types of aperture—one slightly prolonged, rounded, with a single or usually bifid tooth, and more elongated form of test; the shorter test with the aperture flush with the surface and with no neck. The short variety, with rotund inflated sides but sharp keeled, may be known as var. *convexa*, new variety.



FIGS. 35, 36.—TRILOCULINA TRICARINATA D'ORBIGNY. 35, APERTURAL VIEW OF BROAD, PECULIARLY SHAPED SPECIMEN. × 65. FROM ALBATROSS STATION D5160. 36, APERTURAL VIEW OF A MUCH LARGER SPECIMEN WHERE THE OUTER FACE HAS A DOUBLE ANGLE. × 35. FROM ALBATROSS STATION D5236.

The records for the region include 50 stations, ranging in depth from 10 to 901 fathoms (18 to 1,648 meters), the average depth being 231 fathoms (423 meters). Bottom temperatures are given for 25 stations; these range from 38.2° F. (3.4° C.) in the deepest water to 76.3° F. (24.6° C.) in shallow water, the average being 52.9° F. (11.6° C.). The stations are well scattered in the region of the Archipelago, and also occur in the region to the southward in Sibuko Bay, Borneo; Gulf of Boni; Macassar Strait; Molucca Passage; and Darvel Bay, Borneo.

*Triloculina tricarinata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 14550 | U.S.N.M. | 3 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ....... | gy.m., s., sh.. | Few. |
| 14551 | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Rare. |
| 14552 | U.S.N.M. | 1 | D5106... | 14 23 55 N.; 120 32 33 E... | 37 | ....... | gy. m......... | Rare. |
| 14553 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 26 E... | 177 | 52.4 | dk. gn. m.... | Few. |
| 14554 | U.S.N.M. | 5 | D5126... | 10 34 45 N.; 121 47 30 E... | 742 | 49.5 | sft. gn. m.... | Common (very large). |
| 14555 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Rare. |
| 14556 | U.S.N.M. | 2 | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Rare. |
| 14557 | U.S.N.M. | 8 | D5152... | 5 22 55 N.; 120 15 45 E... | 24 | ....... | wht. s....... | Common. |
| 14558 | U.S.N.M. | 6 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Few. |
| 14559 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............. | Rare. |
| 14560 | U.S.N.M. | 4 | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m ....... | Common. |
| 14561 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Rare. |
| 14562 | U.S.N.M. | 8 | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s........ | Common. |
| 14563 | U.S.N.M. | 8 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s ....... | Common. |
| 14564 | U.S.N.M. | 10+ | D5181... | 11 36 48 N.; 123 26 35 E... | 26 | ....... | m., fne. s.... | Common. |
| 14565 | U.S.N.M. | 2 | D5182... | 11 30 40 N.; 123 23 20 E... | 24 | ....... | fne. s., m..... | Few. |
| | | | D5180... | 9 56 30 N.; 123 15 00 E... | 300 | 62.8 | gn. m....... | Common. |
| 14566 | U.S.N.M. | 8 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Few. |
| 14567 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m..... | Rare. |
| 14568 | U.S.N.M. | 6 | D5206... | 11 31 40 N.; 124 42 40 E... | 32 | ....... | gn. m....... | Common. |
| 14569 | U.S.N.M. | 2 | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s..... | Rare. |
| 14570 | U.S.N.M. | 2 | D5211... | 11 51 35 N.; 124 14 00 E... | 155 | 56.6 | gn. m., s.... | Rare. |
| 14571 | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E... | 108 | 50.9 | gy. s., m..... | Rare. |
| 14572 | U.S.N.M. | 2 | D5214... | 12 25 18 N.; 123 37 15 E... | 218 | 51.4 | gn. m........ | Rare. |
| 14573 | U.S.N.M. | 6 | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s..... | Few. |
| 14574 | U.S.N.M. | 10+ | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s..... | Common (very large). |
| 14575 | U.S.N.M. | 1 | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob.. | Few. |
| 14576 | U.S.N.M. | 5 | D5266... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Few. |
| 14577 | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Rare. |
| 14578 | U.S.N.M. | 10+ | D5284... | 13 42 06 N.; 120 30 45 E... | 422 | 42.3 | gy. m., glob.. | Common. |
| 14579 | U.S.N.M. | 2 | D5311... | 21 33 00 N.; 116 15 00 E... | 88 | ....... | crs. s., sh .... | Rare. |
| 14580 | U.S.N.M. | 1 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh ....... | Rare. |
| 14581 | U.S.N.M. | 2 | D5328... | 11 23 45 N.; 119 24 45 E... | 43 | ....... | Co., s., m... | Rare. |
| 14582 | U.S.N.M. | 6 | D5342... | 10 56 55 N.; 119 17 24 E... | 14-25 | ....... | gy. m........ | Common. |
| 14583 | U.S.N.M. | 2 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | Co., s........ | Few. |
| 14584 | U.S.N.M. | 1 | D5358... | 6 06 40 N.; 118 18 15 E... | 30 | ....... | m............ | Rare. |
| 14585 | U.S.N.M. | 3 | D5420... | 9 41 30 N.; 118 50 22 E... | 766 | ....... | gn. m........ | Common (very large). |
| 14586 | U.S.N.M. | 1 | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m. (net).. | Rare. |
| 14587 | U.S.N.M. | 6 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ....... | s., sh., g..... | Common. |
| 14588 | U.S.N.M. | 3 | D5512... | 8 16 02 N.; 123 58 26 E... | 445 | 52.8 | gy. m., fne. s.. | Common. |
| 14589 | U.S.N.M. | 1 | D5548... | 6 00 20 N.; 120 45 35 E... | 232 | 53.5 | s., brk. sh.... | Rare. |
| 14590 | U.S.N.M. | 2 | D5567... | 5 48 00 N.; 120 33 45 E... | 268 | 52.0 | fne. s........ | Few. |
| 14591 | U.S.N.M. | 1 | D5570... | 5 32 15 N.; 120 12 57 E... | 330 | 52.3 | fne. s., glob .. | Rare. |
| 14592 | U.S.N.M. | 1 | D5576... | 5 26 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Rare. |
| 14593 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 169 | 55.5 | br. s., Co ..... | Rare. |
| 14594 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E... | 890 | 38.3 | gy. m., fne. s.. | Rare. |
| 14595 | U.S.N.M. | 2 | D5590... | 4 10 50 N.; 118 39 35 E... | 310 | 44.3 | gn. m., s.... | Few. |
| 14596 | U.S.N.M. | 1 | D5618... | 0 37 00 N.; 127 15 00 E... | 417 | ...... | gy. m........ | Rare. |
| 14597 | U.S.N.M. | 5 | D5650... | 4 53 45 S.; 121 29 00 E.... | 540 | 40.1 | gn. m........ | Frequent. |
| 14598 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E.... | 901 | 38.2 | gy. m........ | Few. |
| 14599 | U.S.N.M. | 1 | .......... | Tara Island, P. I............ | ....... | ....... | ............ | Rare. |

### TRILOCULINA TRICARINATA d'Orbigny, var. CONVEXA, new variety.

*Description.*—Variety differing from the typical in the shorter test and the convex sides.

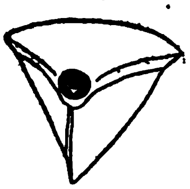


FIG. 37.—TRILOCULINA TRICARINATA D'ORBIGNY. APERTURAL VIEW, × 50. FROM ALBATROSS STATION D5236.

This is constant in its characters at several stations as follows: D5133, Sulu Sea off western Mindanao; D5144, vicinity of Jolo, D5145, the neighboring station; D5268, Verde Island Passage; D5277, China Sea, off southern Luzon; and D5576, north of Tawi Tawi.

With two exceptions, D5268 and D5576, the stations are in less than 100 fathoms (183 meters), ranging from 19 to 80 fathoms (35 to 146 meters). The bottom temperature was recorded in two cases only, D5277, 58.6° F. (14.7° C.), and D5576, 53.5° F. (11.8° C.).

*Triloculina tricarinata, var. convexa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° *F.* | | |
| 13802 | U.S.N.M. | 3 | D5133... | Island off Panabutan Pt. N. 52°; E., 1.50 miles. | 33 | ....... | gn. m., s..... | Few. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 13803 | U.S.N.M. | 2 | D5144... | 6 05 50 N.; 121 02 15 E... | 19 | ....... | co. s......... | Few. |
| 13804 | U.S.N.M. | 1 | D5145... | 6 04 30 N.; 120 59 30 E... | 23 | ....... | co. s., sh..... | Rare. |
| 13805 | U.S.N.M. | 2 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Few. |
| 13806 | U.S.N.M. | 3 | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Few. |
| 13807 | U.S.N.M. | 1 | D5576... | 5 25 56 N.; 120 03 29 E... | 277 | 53.5 | s............. | Few. |

### TRILOCULINA TRICARINATA, var. PLICATA Terquem.

*Triloculina plicata* TERQUEM, Mém. Soc. géol. France, ser. 3, vol. 1, p. 61, pl. 6 (11), fig. 2.

*Miliolina tricarinata*, var. *plicata* HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 562, pl. 41, figs. 17-22.

There are rare specimens at two stations—D5160, Sulu Archipelago, off Tawi Tawi, 12 fathoms (22 meters), and D5236, Pacific Ocean, off the east coast of Mindanao, 494 fathoms (903 meters), which can be referred to this species.

As figured by Terquem and Heron-Allen and Earland, this is rather short, chambers with very decided extended edges, and the chambers often separated by deep clefts.

Terquem's material was from the Pliocene, of the Isle of Rhodes; Heron-Allen and Earland's from the Kerimba Archipelago.

*Triloculina tricarinata, var. plicata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13809 | U.S.N.M. | 1 | D5160... | 5 12 40 N.; 119 55 10 E.... | 12 | ....... | s............. | Rare. |
| 13808 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.... | 494 | 41.2 | fne. gy. s.... | Rare. |

### TRILOCULINA BERTHELINIANA (H. B. Brady).

*Miliolina bertheliniana* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 166, pl. 114, fig. 2.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 563, pl. 41, figs. 32-35.

*Miliolina tricarinata*, reticulated variety, Millett, Journ. Roy. Micr. Soc., 1898, p. 503, pl. 11, fig. 12.

*Miliolina tricarinata*, var. *bertheliniana* Chapman, Journ. Linn. Soc. London (Zoology), vol. 28, 1902, p. 174.

Heron-Allen and Earland, in their Kerimba paper, record this species from Cebu in 45 to 120 fathoms (82 to 220 meters) and note that it "is probably of wide distribution in tropical shallow seas."

Brady describes the species from the following localities: Off Ascension Island, 7 fathoms (13 meters); off Calpentyn, Ceylon, 2 fathoms (4 meters); and in shore sands from near Tamatavé, Madagascar; and near Port Elizabeth, Algoa Bay.

Millett records it from the Malay region as very rare, having but a single specimen from but one station.

Chapman records it from Funafuti and Heron-Allen and Earland from the Kerimba Archipelago.

All the Philippine material is of the short form which Heron-Allen and Earland mention in their paper, none of the longer form being present.

There are also specimens from the nine stations which have the quinqueloculine form and very thin reticulate ornamentation, like the triloculine forms, and may be simply an early quinqueloculine stage.

This species ranges in depth from very shallow water to 318 fathoms (582 meters), representing the following localities: Binang Pool, Subin Bay; Tara Island; Sulu region, off Jolo, off Tawi Tawi, near Basilan; China Sea, off southern Luzon; and between Burias and Luzon.

*Triloculina bertheliniana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13793 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | drk. gy. m.. | Rare. |
| 13791 | U.S.N.M. | 1 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Rare. |
| 13748 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., Co......... | Rare. |
| 13789 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh.... | Rare. |
| 13749 | U.S.N.M. | 1 | D5162... | 5 10 00 N.; 119 47 30 E... | 230 | 52.9 | rs. s. brk. sh. | Rare. |
| 13750 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh... | Rare. |
| 13790 | U.S.N.M. | 3 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Rare. |
| 13751 | U.S.N.M. | 1 | .......... | Binang Pool, Subin Bay, P. I. | ....... | ....... | ............... | Rare. |
| 13752 | U.S.N.M. | 1 | .......... | Tara Island, P. I......... | ....... | ....... | ............... | Rare. |

### TRILOCULINA TERQUEMIANA (H. B. Brady).

*Miliolina terquemiana* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 166, pl. 114, figs. 1*a*, *b*.—DAKIN, Ceylon Pearl-Oyster Fisheries Suppl. Rep., pt. 5, 1906, p. 230, pl. figs. 9, 10.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 563, pl. 41, figs. 29–31.

*Triloculina terquemiana* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 72, pl. 27, fig. 2.

*Miliolina tricarinata*, striate variety, MILLETT, Journ. Roy. Micr. Soc., 1898, p. 508, pl. 11, figs. 10, 11.

*Miliolina tricarinata*, var. *terquemiana* CHAPMAN, Journ. Linn. Soc. Zool., vol. 28, 1900, p. 174.

The only specimens which can be referred to this species are like the inflated form figured by Heron-Allen and Earland from the Kerimba Archipelago. From the records this species seems to be decidedly Indo-Pacific in its range.

The only station at which it occurred is D5154, Sulu Archipelago, Tawi Tawi Group, in 12 fathoms (22 meters).

*Triloculina terquemiana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | °F. |  |  |
| 15701 | U.S.N.M. | 1 | D5154... | 5° 14′ 50″ N.; 119° 58′ 45″ E.... | 12 | ....... | co. s......... | Rare. |

### TRILOCULINA INSIGNIS (H. B. Brady).

*Miliolina insignis* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 45; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 165, pl. 4, figs. 8, 10.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 562.

*Triloculina insignis* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 72, pl. 27, fig. 1.

There are rare specimens from *Albatross* station D5141, off Jolo, 29 fathoms (52 meters), and D5236, Pacific Ocean, east coast of Mindanao, 494 fathoms (903 meters), which may be referred to this species.

There seems to be a mixture of forms in the material described by Brady. In the *Challenger* Report (pl. 4, fig. 8) is evidently a triloculine form of *Biloculina comata* Brady, as shown by the form of the aperture. Some such specimens are often found where *B. comata* is abundant. Brady has a single North Pacific record from deep water for this species. This may have been the form of *B. comata* which he figures. Flint[a] figures a form (pl. 45, fig. 2) and has it from the same station from which he reports *B. comata*, and the two probably represent the same species.

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[a] Ann. Rep. U. S. Nat. Mus., 1897 (1899).

Returning to the *Challenger* Report (pl. 4, fig. 10) refers to a different species and may be taken as the type of *T. insignis*. This is a striate form of the *T. trigonula* group, and apparently found in shallow water tropical regions. It may be suggested that the form figured by Heron-Allen and Earland from Kerimba (pl. 41, figs. 29, 31) is the inflated form of *T. terquemiana*, and may really be this species, which is very similar to *Challenger* (pl. 4, fig. 10), noted above.

*Triloculina insignis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13825 | U.S.N.M. | 1 | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s......... | Rare. |
| 13826 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| 15777 | U.S.N.M. | 1 | D5425... | 9 37 45 N.; 121 12 37 E.. | 495 | 49.4 | gy. m., co. s. | Rare. |

### TRILOCULINA OBLONGA (Montagu).

Plate 92, figs. 3*a–c*.

*Vermiculum oblongum* Montagu, Test. Brit., 1803, p. 522, pl. 14, fig. 9.

*Triloculina oblonga* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 300, No. 16.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 69, pl. 26, fig. 3.

*Miliolina oblonga* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 160, pl. 5, figs. 4*a*, *b*.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 566.—Sidebottom, Journ. Roy. Micr. Soc., 1918, p. 7, pl. 1, figs. 15, 16.

This usually common species occurs at but five stations, and is not common at any of them. These range in depth from 61 to 494 fathoms (112 to 903 meters); bottom temperatures range from 41.2° F. to 56.4° F. (5.1° C. to 13.5° C.).

These few stations are east of Masbate Island; Pacific Ocean, east coast of Mindanao; Palawan Passage; between Samar and Leyte; and off Jolo.

*Triloculina oblonga—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13824 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Rare. |
| | | | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |
| | | | D5348... | 10 57 00 N.; 118 38 15 E.. | 375 | 56.4 | co. s ........ | Rare. |
| 13822 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E.. | 61 | ....... | s., sh., g..... | Rare. |
| 13823 | U.S.N.M. | 4 | D5549... | 6 01 15 N.; 120 44 20 E.. | 263 | 52.3 | s., glob., for .. | Few. |

### TRILOCULINA ROTUNDA d'Orbigny.

*Triloculina rotunda* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 299, No. 4.—Schlumberger, Mém. Soc. Zool. France, vol. 6, 1893, p. 64, pl. 1, figs. 48–5 figs. 11, 12 (in text).

*Miliolina rotunda* Millett, Journ. Roy. Micr. Soc., 1898, p. 267, pl. 5, figs. 15 16.—Sidebottom, Mem. Proc. Manchester Lit. and Philos. Soc., vol. 48, No. 5 1905, p. 8.—Heron-Allen and Earland, Proc. Roy. Irish Acad., vol. 31 pt. 64, 1913, p. 25.—Wiesner, Archiv. Prot., vol. 25, 1912, p. 225.—Heron Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 568, pl. 4 figs. 27–30.

I have records of this species from six stations, ranging in depth from 10 to 569 fathoms (18 to 1,040 meters), the average depth 3 fathoms. Bottom temperatures are given at but two stations 41.2° F. (5.1° C.) and 56.4° F. (13.5° C.). Of these stations the one at 10 fathoms (18 meters) is the only one in shallow water, the next deepest station being in 298 fathoms (545 meters).

The localities are China Sea, off southern Luzon; Pacific Ocean east coast of Mindanao; Palawan Passage; and to the southward between Gillolo and Makyan Island; south of Patiente Strait; and Molucca Passage.

*Triloculina rotundata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13816 | U.S.N.M. | 1 | D5109 | 14 08 45 N.; 120 16 30 E. | 10 | ...... | Co. | Rare. |
| 13817 | U.S.N.M. | 4 | D5236 | 8 50 45 N.; 126 26 52 E. | 494 | 41.2 | fne. gy. s. | Few. |
| 13819 | U.S.N.M. | 2 | D5348 | 10 57 45 N.; 118 38 15 E. | 375 | 56.4 | co. s. | Few. |
| 13820 | U.S.N.M. | 1 | D5618 | 0 37 00 N.; 127 15 00 E. | 417 | ...... | gy. m. | Rare. |
| 13818 | U.S.N.M. | 2 | D5621 | 0 15 00 N.; 127 24 35 E. | 298 | ...... | gy. and bk. s. (m. b.). | Few. |
| 13821 | U.S.N.M. | 1 | D5630 | 0 56 30 S.; 128 05 00 E. | 569 | ...... | co. s., m. | Rare. |

### TRILOCULINA VALVULARIS Reuss.

*Triloculina valvularis* Reuss, Zeitsch. deutsch. geol. Ges., vol. 3, 1851, p. 85, pl. 7, fig. 56.

*Miliolina valvularis* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 161, pl. 4, figs. 4, 5.—Millett, Journ. Roy. Micr. Soc., 1898, p. 501, pl. 11, figs. 5–7.—Flint, Rep. U. S. Nat. Mus., 1897 (1899), p. 290, pl. 44, fig. 4.—Chapman, Journ. Linn. Soc., vol. 28, 1900, p. 172.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 599.

There are only two stations for this species—D5333, Mindoro Strait, in 310 fathoms (567 meters), where it is very common, and D5650, Gulf of Boni, 540 fathoms (988 meters), where it is rare.

This species is also found off New Zealand, and may be different from that of Reuss.

Heron-Allen and Earland record it from Kerimba, and note that their material was very variable, but that the triloculine form was most abundant.

*Triloculina valvularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13800 | U.S.N.M. | 10 | D5333... | 12 26 30 N.; 120 37 45 E.. | 310 | 73.8 | s............ | Common. |
| 13801 | U.S.N.M. | 1 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Rare. |

### TRILOCULINA SUBORBICULARIS d'Orbigny.

*Miliolina suborbicularis* Heron-Allen and Earland, Journ. Roy. Micr. Soc., 1911, p. 304; Trans. Zool. Soc. London, vol. 20, 1915, p. 560.

*Quinqueloculina suborbicularis* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 302, No. 29.—Schlumberger, Mém. Soc. Zool., France, 1893, p. 215, text figs. 26–28; pl. 2, figs. 63–64; pl. 3, fig. 67.

*Triloculina suborbicularis* d'Orbigny, Ann. Sci. Nat., vol. 7, 1826, p. 300, No. 12.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 70, pl. 21, fig. 3.

There are single, very typical, specimens from three stations—D5154, Tawi Tawi Group, Sulu Archipelago; D5162, Tawi Tawi Group, Sulu Archipelago; and D5179, off Romblon.

In these specimens the two last-formed chambers are almost opposite one another, and they have the fine striations characteristic of this species.

*Triloculina suborbicularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13854 | U.S.N.M. | 1 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s......... | Rare. |
| 13855 | U.S.N.M. | 1 | D5179... | 5 10 00 N.; 119 47 30 E.. | 230 | 52.9 | crs. s., bk. sh. | Rare. |
| 13856 | U.S.N.M. | 1 | D5162... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Rare. |

### TRILOCULINA CUNEATA Karrer.

Plate 92, figs. 4*a*–*c*.

*Triloculina cuneata* Karrer, Sitz. Akad. Wiss. Wien, vol. 55, Abteil. 1, 1867, p. 359, pl. 2, fig. 8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 71, pl. 17, fig. 1.

*Miliolina cuneata* Rhumbler, Zool. Jahrb., Abteil. Syst., vol. 24, 1907, p. 42, pl. 3, fig. 22.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 569.

There are single specimens from five stations. These are China Sea, off southern Luzon; between Burias and Luzon; between Samar and Leyte; and in shallow water off Jolo Jolo.

All these stations are in shallow water, ranging in depth from 18 to 61 fathoms (33 to 112 meters).

Rhumbler records it from off Laysan Island. Many of the specimens, according to variable information, are biloculine in character, showing that this is a species which is tending to become possibly more related to *Biloculina* than *Triloculina* in its later characters.

*Triloculina cuneata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °*F.* | | |
| 13812 | U.S.N.M. | 1 | D5096... | 14 20 23 N.; 120 34 15 E... | 28 | ........ | gy. m., s., sh. | Rare. |
| 13813 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ........ | crs. s.......... | Rare. |
| 13814 | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ........ | sh., p., s...... | Rare. |
| 13815 | U.S.N.M. | 1 | D5481... | 10 27 30 N.; 125 17 10 E... | 61 | ........ | s., sh., g...... | Rare. |
| 13811 | U.S.N.M. | 1 | .......... | Exterior pearl oyster, Jolo Jolo, P. I. | ........ | ........ | .............. | Rare. |

### TRILOCULINA CUNEATA Karrer, var. INCISA, new variety.

Plate 93, figs. 1a-c.

*Description.*—Test differing from the typical largely in the character of the surface, which is ornamented by numerous short, sharply incised markings lengthwise of the test.

Specimen from shallow water from Siasi Island, Philippines.

*Triloculina cuneata*, var. *incisa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | °*F.* | | |
| 12796 | U.S.N.M. | 1 | .......... | Siasi Id, P. I............... | ........ | ........ | Shallow water. | Rare. |

### TRILOCULINA CIRCULARIS Bornemann.

Plate 92, figs. 1, 2.

*Triloculina circularis* BORNEMANN, Zeitschr. deutsch. geol. Ges., vol. 7, 1855, p. 349, pl. 19, fig. 4.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 67, pl. 25, fig. 4; pl. 26, fig. 1.

*Miliolina circularis* H. B. BRADY, Rep. Voy. *Challenger*, Zoology vol. 9, 1884, p. 169, pl. 4, figs. 3 a-c; pl. 5, figs. 13, 14?.—CHAPMAN, Trans. New Zealand Inst., vol. 38, 1906, p. 81.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 557.—SIDEBOTTOM, Journ. Roy. Micr. Soc., 1918, p. 8.

There is very typical material from 15 stations in the area, ranging in depth from 20 to 554 fathoms (37 to 1,012 meters), the average depth being 209 fathoms (383 meters); bottom temperature is given at eight stations, ranging from 52.3° F. to 75.7° F. (11.2° C. to 24.2° C.), the average temperature 58° F. (14.4° C.).

The specimens are of the form described by Bornemann, and are similar to those found in other parts of the Indo-Pacific region.

*Triloculina circularis*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13774 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E.. | 20 | ....... | co. s......... | Rare. |
| 13775 | U.S.N.M. | 1 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh.... | Rare. |
| 13776 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E.. | 49 | ....... | co. s., sh.... | Rare. |
| 13777 | U.S.N.M. | 3 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 13778 | U.S.N.M. | 7 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s....... | Common. |
| 13779 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 13780 | U.S.N.M. | 1 | D5230... | 10 01 50 N.; 124 42 30 E.. | 118 | 57.6 | gy. s........ | Rare. |
| 13781 | U.S.N.M. | 1 | D5409... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m.(net).. | Rare. |
| 13782 | U.S.N.M. | 6 | D5546... | 6 06 48 N.; 121 20 32 E.. | 138 | 58.3 | fne. co. s.... | Frequent. |
| 13783 | U.S.N.M. | 2 | D5549... | 6 01 15 N.; 120 44 29 E.. | 263 | 62.3 | s., glob. for.. | Few. |
| 13784 | U.S.N.M. | 2 | D5572... | 5 31 26 N.; 120 09 45 E.. | 334 | 52.3 | s............ | Rare. |
| 13785 | U.S.N.M. | 1 | D5575... | 5 28 30 N.; 120 02 27 E.. | 315 | 52.3 | Co., s........ | Rare. |
| 13786 | U.S.N.M. | 3 | D5576... | 5 25 56 N.; 120 08 30 E.. | 277 | 53.3 | s............ | Few. |
| 13788 | U.S.N.M. | 1 | .......... | Exterior pearl oyster, Jolo Jolo, P. I. | ...... | ....... | .............. | Rare. |
| 13787 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob. | Rare. |

### TRILOCULINA LINNEIANA d'Orbigny.

*Triloculina linneiana* D'ORBIGNY, in De La Sagra, Hist. Fis. Pol. Nat. Cuba, 1839, "Foraminifères," p. 153, pl. 9, figs. 11, 13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 72, pl. 27, fig. 4.

*Miliolina linnaeana* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 174, pl. 6, figs. 15–20.

This species, as might be expected, is very typical and finely developed at many stations, the most abundant and finest specimens being found in comparatively shallow water.

Of the 21 stations at which it is recorded, ranging in depth from 10 to 500 fathoms (18 to 914 meters), the average depth is 166 fathoms (303 meters). It is most numerous and best developed about the islands of the Sulu Archipelago in shallow water, usually under 20 fathoms (37 meters). It has also occurred in Verde Island Passage; China Sea, off southern Luzon; east of Masbate; between Burias and Luzon; and off Romblon.

*Triloculina linneiana*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13753 | U.S.N.M. | 8 | D5137... | 6 04 25 N.; 120 58 30 E.. | 20 | ....... | s., sh........ | Common. |
| 13754 | U.S.N.M. | 7 | D5138... | 6 06 00 N.; 120 58 50 E.. | 19 | ....... | s., Co........ | Common. |
| 13755 | U.S.N.M. | 3 | D5139... | 6 06 00 N.; 121 02 30 E.. | 20 | ....... | co. s.......... | Few. |
| 13757 | U.S.N.M. | 2 | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s.......... | Few. |
| 13758 | U.S.N.M. | 6 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh..... | Few. |
| 13759 | U.S.N.M. | 10+ | D5143... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Common. |
| 13756 | U.S.N.M. | 3 | D5144... | 6 05 50 N.; 121 02 15 E.. | 19 | ....... | co. s.......... | Rare. |
| 13760 | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E.. | 17 | ....... | co. s ......... | Common. |
| 13761 | U.S.N.M. | 1 | D5149... | 5 33 00 N.; 120 42 10 E.. | 10 | ....... | Co., sh ...... | Few. |
| 13762 | U.S.N.M. | 10 | D5151... | 5 24 40 N.; 120 27 15 E.. | 24 | ....... | s., sh........ | Common. |
| 13763 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wht. s........ | Rare. |
| 13764 | U.S.N.M. | 6 | D5154... | 5 14 50 N.; 119 58 45 E.. | 12 | ....... | co. s.......... | Common. |
| 13767 | U.S.N.M. | 2 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Few. |
| 13770 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ....... | s., p.......... | Rare. |
| 13771 | U.S.N.M. | 1 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Rare. |
| 13768 | U.S.N.M. | 1 | D5212... | 12 04 15 N.; 124 04 36 E.. | 108 | 59.9 | gy. s. m..... | Rare. |
| 13769 | U.S.N.M. | 6 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s......... | Common. |
| 13766 | U.S.N.M. | 3 | D5162... | 5 10 00 N.; 119 47 30 E.. | 230 | 52.9 | crs. s., brk. sh. | Few. |
| 13765 | U.S.N.M. | 1 | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s.......... | Rare. |
| 13772 | U.S.N.M. | 1 | D5409... | 13 36 48 N.; 123 38 24 E.. | 500 | ....... | gn. m (net).. | Rare. |
| 13773 | U.S.N.M. | 1 | D5571... | 5 30 45 N.; 120 07 57 E.. | 340 | 52.8 | s., sh......... | Rare. |

### TRILOCULINA RUPERTIANA (H. B. Brady).

Plate 93, figs. 2*a–e*.

*Miliolina rupertiana* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 19, 1879, p. 46; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 178, pl. 7, figs. 7–12.—MILLETT, Journ. Roy. Micr. Soc., 1898, p. 269, pl. 6, fig. 13.—DAKIN, Ceylon Pearl-Oyster Fisheries, Suppl. Rep., pt. 5, 1906, p. 230.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 565.

The only material of this species is a very fine large specimen, 3 mm. in length, from the station D5134, Sulu Archipelago, near Basilan Island, in 25 fathoms (46 meters). Millett records his material from the Malay region at several stations, but in few numbers. The *Challenger* records include several stations about the islands on the south shores of New Guinea, and west of Torres Strait in 6 to 28 fathoms (11 to 51 meters), "and even here the species is very rare."

Other records given by Brady are the northwest coast of Ceylon, 2 fathoms (4 meters), north of Suez, 15 to 20 fathoms (27 to 37 meters), and in shore sands, near Tamatavé, on the east coast of Madagascar. At the last station it was plentiful.

Heron-Allen and Earland record it from the Kerimba Archipelago, and note that it is "extremely common at Perim in the Red Sea," and that it also occurs on the Queensland coast. Dakin gives it as "frequent off Ceylon."

From the records it is evident the species is more characteristic of the Indian Ocean and the coast of Africa than in the Pacific part of this region, and is evidently most common in very shallow water. It resembles in its highly specialized ornamentation certain of the Eocene species of western Europe and North America.

*Triloculina rupertiana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 13794 | U.S.N.M. | 1 | D5134... | 6° 44′ 45″ N.; 121° 48′ 00″ E... | 25 | °F.<br>....... | fne. s........ | Rare. |

### TRILOCULINA TORTUOSA, new species.

*Quinqueloculina agglutinans* CUSHMAN (not d'Orbigny), Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 42, pl. 9, fig. 1.

*Description.*—Test triloculine, in the adult condition elongate, slender, the chambers somewhat twisted; walls made of coarse fragments on the exterior; peripheral end produced into a cylindrical neck, usually smooth; aperture circular; lip thin, slightly expanded, with a slender bifid tooth.

Length 1 to 1.1 mm.

*Distribution.*—Type specimen (Cat. No. 13622, U.S.N.M.) from *Albatross* station D5192, off northern Cebu, in 32 fathoms (59 meters).

Other localities represent 7 stations, ranging in depth from 18 to 80 fathoms (33 to 146 meters), the average depth being 34 fathoms (62 meters). Bottom temperatures are given at 2 stations, ranging from 58.6° F. to 75.7° F. (14.7° C. to 24.2° C.). These localities are China Sea, off southern Luzon; off Romblon; off eastern Panay; and between Burias and Luzon.

This species is a peculiar, and, in the Philippine material, a very distinctive one. The peculiar twisted character, long slender form, with the extended smooth neck, and especially very coarse material of the test, all make it conspicuous among the other arenaceous species that occur with it. It is found in comparatively shallow water.

*Triloculina tortuosa—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5096... | 14 20 23 N.; 120 34 15 E.. | 28 | ....... | gy.m., sh., s. | Rare. |
| 13819 | U.S.N.M. | 2 | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy.m., s., sh. | Few. |
| 13820 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Rare. |
| 13821 | U.S.N.M. | 6 | D5181... | 11 36 40 N.; 123 26 35 E.. | 26 | ....... | m., fne. s.... | Common. |
| 13822 | U.S.N.M. | 5 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s......... | Common. |
| 13823 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E.. | 26 | ....... | crs. s........ | Rare. |
| 13824 | U.S.N.M. | 3 | D5276... | 13 49 15 N.; 120 14 45 E.. | 18 | ....... | sh., p., s..... | Few. |
| 13825 | U.S.N.M. | 1 | D5277... | 13 56 55 N.; 120 13 45 E.. | 80 | 58.6 | fne. s........ | Rare. |

### Genus FLINTINA, new genus.

*Description.*—Test free, in its earliest stages quinqueloculine, followed very early by a triloculine development, which is maintained in all the later chambers, which become planospiral, usually taking three to make a complete cycle; wall imperforated, porcellaneous; aperture with a large orifice, with a thickened border, and large complex tooth.

*Type of the genus.*—*Flintina bradyana*, new species.

This genus, while somewhat like *Planospirina*, differs from that genus in its development. *Planospirina* has no quinqueloculine or triloculine stages, but has a planospiral test from the beginning. *Flintina*, on the other hand, has a derivative from *Triloculina* through the quinqueloculine stages.

It is named in honor of the late Dr. James M. Flint, whose excellent work on the *Albatross* Foraminifera is well known.

#### FLINTINA BARTSCHI, new species.

*Description.*—Test generally triangular; last-formed whorl of three chambers, polygonal in transverse section, the apertural face flat or slightly concave, the lateral faces generally somewhat concave with a sharp angle between the apertural and lateral faces; in the last-formed chamber the lateral face is somewhat convex, the chamber broadest near the middle, tapering toward either end, with a slightly-thickened cylindrical neck; the surface of the test smooth dull matt, cream white.

Diameter 1.6 mm.

*Distribution.*—Type specimen (Cat. No. 10801, U. S. N. M.) from *Albatross* station D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters), bottom temperature 41.2° F. (5.1° C.).

This is a peculiar but very well-characterized species, with its triangular form, matt surface, and sharp angles.

It is named for Dr. Paul Bartsch, of the United States National Museum, who was in charge of the Philippine collecting of the *Albatross* during the early part of her Philippine cruise.

*Flintina bartschi—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10801 | U.S.N.M. | 1 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Rare. |

### FLINTINA TRIQUETRA (H. B. Brady).

Plate 94, figs. 1*a*–*c*.

*Miliolina triquetra* H. B. Brady, Quart. Journ. Micr. Soc., vol. 19, 1879, p. 54; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 181, pl. 8, figs. 8–10.—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 581, pl. 44, figs. 22, 23.

This species, with a planospiral character in the adult, with three chambers making up a whorl, belongs to *Flintina*, as here described. It is rare at *Albatross* station D5214, east of Masbate Island, in 218 fathoms (399 meters), the bottom temperature, 51.4° F. (10.8° C.).

Heron-Allen and Earland record is as "very finely developed off Cebu, Philippine Islands; 120 fathoms (220 meters)."

Brady's original records are from three *Challenger* stations—Bass Strait, 38 fathoms (70 meters); Torres Strait, 155 fathoms (283 meters); and Humboldt Bay, New Guinea, 37 fathoms (68 meters).

It is a rare species from the records, largely limited to Australia and the East Indian region, and found also in the Kerimba Archipelago, where Heron-Allen and Earland record two specimens.

*Flintina triquetra—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10802 | U.S.N.M. | 2 | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m....... | Rare. |

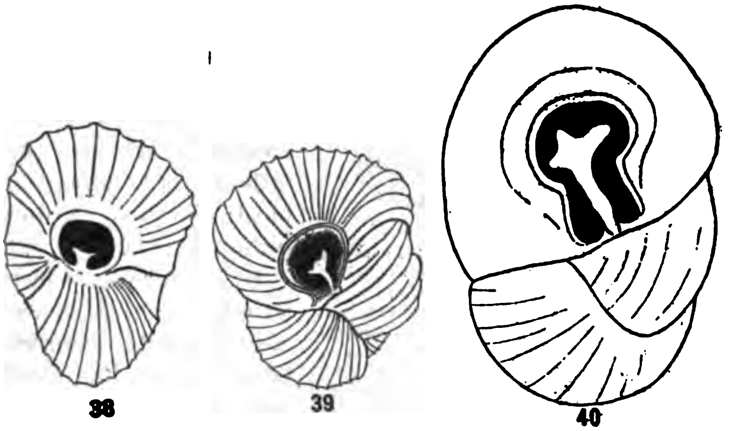
### FLINTINA BRADYANA, new species.

Plate 94, fig. 2.

*Miliolina fichteliana* H. B. Brady (not d'Orbigny 1839), Rep. Voy. *Challenger*, Zoology, vol. 9. 1884, p. 169, pl. 4, fig. 9.

*Description.*—Test triloculine, after a typical early quinqueloculine development, then in the adult planospiral; wall highly polished, with numerous fine longitudinal and slightly oblique costae; aperture large with a thickened lip and large tooth, complex in the adult. Diameter up to 3 mm.

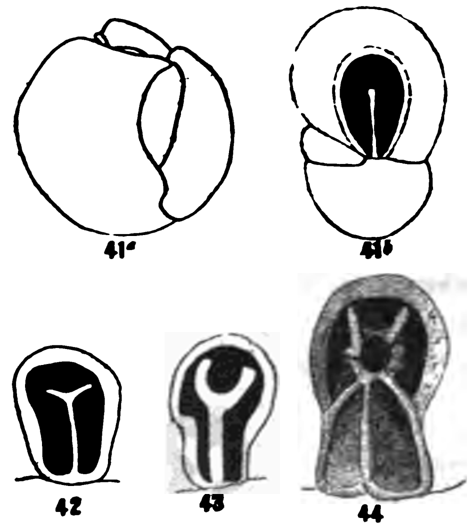
*Distribution.*—Type specimen (Cat. No. 10851, U. S. N. M.) from *Albatross* station D5192, off northern Cebu, in 32 fathoms (59 meters).



Figs. 38-40.—Flintina bradyana, new species. 38, specimen with simple bifid tooth. × 100. From Albatross station D5141. 39, specimen in later stage with broadened tooth. × 50. From Albatross station D5164. 40, larger specimen with reduced costae, the last-formed chamber smooth, the tooth sending out processes toward the wall at the sides of the aperture. × 50.

This is an abundant species in the Philippines at numerous stations, and is evidently the species which Brady figures, although only a partially developed specimen is figured by him. In the development of the tooth of this species, figures of which are given in the plates, there is first the typical single tooth of *Quinqueloculina*, followed by a bifid tooth characteristic of *Triloculina;* then is developed a large rounded plate-like portion, which becomes united to the border of the aperture by several projections, and later the circular plate itself becomes perforated in the center and serves largely as the aperture in the adult. This is one of the most complex developments of the aperture in the family and is very similar to that found in *Quinqueloculina albatrossi.*

*F. bradyana* has occurred at 22 stations; one of these at San Luis, Apra Bay, Guam, in shallow water; the others, except D5613, Gulf of Tomini, Celebes, are in the Archipelago and the following localities: China Sea, off southern Luzon; Sulu Sea, off southwestern Mindanao; near Basilan Island; off Tawi Tawi; off Jolo; off Romblon: off northern Cebu; between Marinduque and Luzon; Palawan Passage; and Malampaya Sound, Palawan Island.



FIGS. 41-44.—FLINTINA BRADYANA, NEW SPECIES. × 50. FROM ALBATROSS STATION D5133. 41a, SIDE VIEW; b, APERTURAL VIEW OF YOUNG SPECIMEN WITH SIMPLE TOOTH. 42, APERTURE OF OLDER SPECIMEN WITH BIFID TOOTH. 43, APERTURE OF A STILL OLDER SPECIMEN WITH THE PROCESSES OF THE TOOTH BEGINNING TO EXTEND IN AND THE OPENING TO HAVE ANGLES. 44, APERTURE OF AN ADULT WHERE THE ARMS HAVE MET TO FORM A CENTRAL RING, ADDITIONAL ARMS EXTENDED FROM EITHER SIDE OF THE APERTURE AT THE ANGLES AND SECONDARY ARMS BEING GIVEN OFF ON THE SIDES OF THE RING.

These stations range in depth from 14 to 752 fathoms (25 to 1,375 meters), the average depth being 100 fathoms (183 meters). Bottom temperatures are given at but 3 stations, ranging from 56.4° F. to 59.6° F. (13.5° C. to 15.3° C.). Most of the stations at which this is really abundant are less than 50 fathoms (191 meters), and most of them around 30 fathoms (55 meters) in depth.

It is probably widely distributed in this general region from its occurrence at Guam, and has probably been referred to the name given by Brady in the *Challenger* report, but the study of the original material is necessary to determine this.

*Flintina bradyana—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 10840 | U.S.N.M. | 10+ | D5097... | 14 19 15 N.; 120 33 52 E.. | 30 | ....... | gy. m., s., sh. | Common. |
| 10841 | U.S.N.M. | 6 | D5100... | 14 17 15 N.; 120 32 40 E.. | 35 | ....... | gy. s........ | Common. |
| 10842 | U.S.N.M. | 4 | D5106... | 14 23 55 N.; 120 32 33 E.. | 37 | ....... | gy. m........ | Common. |
| 10843 | U.S.N.M. | 1 | D5110... | 13 59 20 N.; 120 75 45 E.. | 135 | 50.0 | dk. gy. m.... | Rare. |
| 10844 | U.S.N.M. | 2 | D5113... | 13 51 30 N.; 120 50 30 E.. | 159 | ....... | dk. gn. m.... | Rare. |
| 10845 | U.S.N.M. | 10+ | D5132... | Island off Panabutan Pt. N.; 15° W., 0.30 mile. | 26 | ....... | gn. m., s..... | Common. |
| 10846 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Pt. N.; 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Common. |
| 10847 | U.S.N.M. | 1 | D5134... | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | gy. s........ | Rare. |
| 10848 | U.S.N.M. | 7 | D5152... | 5 22 55 N.; 120 15 45 E.. | 34 | ....... | wht. s....... | Common. |
| 10849 | U.S.N.M. | 10+ | D5164... | 5 01 40 N.; 119 52 20 E.. | 18 | ....... | gn. m........ | Common. |
| 10850 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ....... | fne. s........ | Rare. |
| 10851 | U.S.N.M. | 5 | D5192... | 11 09 15 N.; 123 50 00 E.. | 32 | ....... | gn. s........ | Common. |
| 10852 | U.S.N.M. | 4 | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m.... | Common. |
| 10853 | U.S.N.M. | 10+ | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Common. |
| 10854 | U.S.N.M. | 10+ | D5338... | 11 33 45 N.; 119 24 45 E.. | 43 | ....... | Co., s., sh.... | Common. |
| 10855 | U.S.N.M. | 2 | D5339... | 11 22 00 N.; 119 12 00 E.. | 52 | ....... | m............ | Few. |
| 10856 | U.S.N.M. | 2 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m........ | Few. |
| 10857 | U.S.N.M. | 5 | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co., s........ | Few. |
| 10858 | U.S.N.M. | 1 | D5358... | 6 06 40 N.; 118 18 15 E.. | 39 | ....... | m............ | Rare. |
| 10859 | U.S.N.M. | 2 | D5426... | 9 12 00 N.; 118 28 00 E.. | 27 | ....... | fne. gy. s.... | Rare. |
| 10860 | U.S.N.M. | 2 | D5613... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m........ | Rare. |
| 10839 | U.S.N.M. | 3 | .......... | San Luis, Apra Bay, Guam. | ....... | ....... | .............. | Rare. |

## Genus BILOCULINA d'Orbigny, 1826.

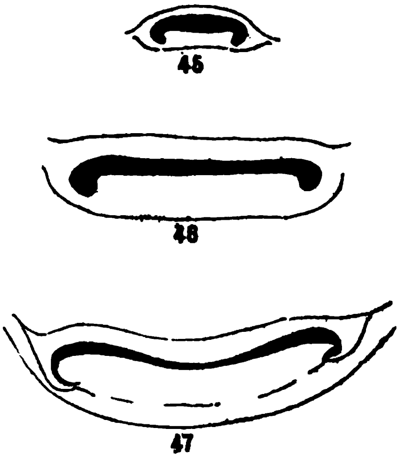
### BILOCULINA DEPRESSA d'Orbigny.

Plate 96, figs. 2*a*, *b*.

*Biloculina depressa* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 298, No. 7.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 145, pl. 2, figs. 12, 16, 17; pl. 3, figs. 1, 2.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 74, pl. 28, figs. 1, 2.

This is one of the most common species of the genus, occurring usually in the deeper water, as is shown elsewhere. It has occurred at 44 stations in the material, ranging in depth from 78 to 1,560 fathoms (143 to 2,853 meters), the average 475 fathoms (869 meters). Bottom temperatures are given at 27 stations, ranging from 36.3° F. to 59.6° F. (2.3° C. to 15.3° C), the average being 48.5° F. (19.1° C.).

Specimens are not common at any of the stations. They were found mostly in the deeper water of the Sulu Sea, China Sea, and between the islands; also in the region to the south, in Sibuko Bay, Borneo; Gulf of Tomini, Celebes; Molucca; between Gillolo and Makyan Island; off Bouro Island; Molucca Sea; Flores Sea; Gulf of Boni; and Macassar Strait.



FIGS. 45-47.—BILOCULINA DEPRESSA D'ORBIGNY. 45, APERTURE OF YOUNG SPECIMEN, WITH ELLIPTICAL APERTURE AND ELONGATE TOOTH. × 50. FROM ALBATROSS STATION D5236. 46, APERTURE OF A LATER STAGE SHOWING THE GREATER ELONGATION OF THE APERTURE AND TOOTH. × 100. FROM ALBATROSS STATION D5201. 47, APERTURE OF AN ADULT WITH VERY NARROW CURVED APERTURE, LARGELY OCCUPIED BY THE SOMEWHAT EXPANDED TOOTH. × 40. FROM ALBATROSS STATION D5236.

This is a common species of deep and cooler waters in all the oceans.

*Biloculina depressa*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14632 | U.S.N.M. | 1 | D5112... | 13 48 22 N.; 120 47 25 E.. | 177 | 52.4 | dk. gn. m.... | Few. |
| 15784 | U.S.N.M. | 1 | D5178... | 12 43 00 N.; 122 06 15 E.. | 78 | ........ | fne. s........ | Rare. |
| 14631 | U.S.N.M. | 1 | D5186... | 10 05 45 N.; 122 18 30 E.. | 638 | 49.8 | gn. m........ | Rare. |
| 15785 | U.S.N.M. | 1 | D5198... | 9 40 50 N.; 123 39 45 E.. | 220 | 58.9 | gn. m........ | Rare. |
| 14633 | U.S.N.M. | 4 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 53.8 | gy. s., m..... | Few. |
| 15786 | U.S.N.M. | 1 | D5214... | 12 25 18 N.; 123 37 15 E.. | 218 | 51.4 | gn. m........ | Few. |
| 15787 | U.S.N.M. | 2 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Few. |
| 14634 | U.S.N.M. | 10+ | D5250... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m........ | Frequent. |
| 15788 | U.S.N.M. | 1 | D5260... | 12 25 35 N.; 121 31 35 E.. | 234 | 51.4 | gn. m., s..... | Rare. |
| 14635 | U.S.N.M. | 8 | D5268... | 13 42 00 N.; 120 57 15 E.. | 170 | ........ | s., p.......... | Frequent. |
| | | | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 59.6 | fne. s., m., sh. | Few. |
| | | | D5300... | 20 31 00 N.; 115 49 00 E.. | 265 | ........ | gy. m., s..... | Few. |
| | | | D5318... | 21 32 00 N.; 117 46 00 E.. | 840 | ........ | s., br. Co .... | Few. |
| | | | D5348... | 10 57 45 N.; 118 38 15 E.. | 375 | 56.4 | co. s.......... | Few. |
| 14636 | U.S.N.M. | 3 | D5349... | 10 54 00 N.; 118 26 20 E.. | 730 | 46.0 | co. s.......... | Few. |

*Biloculina depressa*—*Material examined*—Continued.

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | | | |
| | | | D5419... | 9 58 30 N.; 123 46 00 E.. | 175 | 54.5 | gn. m....... | Few. |
| | | | D5422... | 9 38 30 N.; 121 11 00 E.. | 508 | 49.8 | gy. m., co. s.. | Few. |
| 14638 | U.S.N.M. | 3 | D5425... | 9 37 45 N.; 121 11 00 E.. | 495 | 49.4 | gy. m., co. s.. | Few. |
| | | | D5443... | 12 43 05 N.; 125 01 00 E.. | 241 | 51.3 | co. s., sh..... | Few. |
| 14639 | U.S.N.M. | 1 | D5447... | 13 28 00 N.; 123 46 18 E.. | 310 | 45.3 | gn. m....... | Few. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E.. | 480 | ....... | gy. m....... | Few. |
| | | | D5468... | 13 35 30 N.; 123 40 28 E.. | 560 | ....... | gn. m....... | Few. |
| | | | D5470... | 13 37 30 N.; 123 41 09 E.. | 880 | ....... | m........... | Few. |
| | | | D5485... | 9 06 30 N.; 125 00 20 E.. | 967 | 52.3 | gy. m....... | Few. |
| | | | D5523... | 8 48 44 N.; 123 27 35 E.. | ....... | ....... | ............... | Rare. |
| | | | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob.. | Frequent. |
| 14637 | U.S.N.M. | 1 | D5537... | 9 11 00 N.; 123 28 00 E.. | 254 | 55.5 | gn. m....... | Rare. |
| | | | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s..... | Frequent. |
| 14640 | U.S.N.M. | 10+ | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Frequent. |
| | | | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Few. |
| 14641 | U.S.N.M. | 10+ | D5590... | 4 10 50 N.; 118 39 35 E.. | 310 | 44.3 | gn. m., s..... | Frequent. |
| | | | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | ............... | Few. |
| | | | D5592... | 4 12 44 N.; 118 27 44 E.. | 305 | 42.3 | gn. m....... | Few. |
| 14642 | U.S.N.M. | 1 | D5601... | 1 13 10 N.; 125 17 06 E.. | 765 | ....... | s., glob., ptr. | Few. |
| | | | D5609... | 0 11 00 S.; 121 16 00 E.. | 1,092 | 38.3 | gn. m....... | Few. |
| | | | D5612... | 0 42 00 S.; 121 44 00 E.. | 752 | ....... | gy. m....... | Few. |
| | | | D5618... | 0 37 00 N.; 127 15 00 E.. | 417 | ....... | gy. m....... | Few. |
| | | | D5621... | 0 15 00 N.; 127 24 35 E.. | 298 | ....... | gy. & bk. s. (m. b.). | Few. |
| | | | D5637... | 3 53 20 S.; 126 48 00 E.. | 700 | ....... | gy. m....... | Few. |
| 14643 | U.S.N.M. | 3 | D5639... | 3 54 50 S.; 123 27 20 E.. | 1,560 | ....... | gy. m....... | Few. |
| | | | D5660... | 5 36 30 S.; 120 49 00 E.. | 692 | ....... | gy. m., s..... | Few. |
| 14644<br>15780 | U.S.N.M.<br>U.S.N.M. | 1<br>10+ | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Frequent. |
| | | | D5663... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Few. |
| 14645 | U.S.N.M. | 3 | H4896... | 7 43 45 N.; 122 03 45 E.. | 221 | ....... | gy. m., glob.. | Few. |

### BILOCULINA MURRHYNA Schwager.

*Biloculina murrhyna* Schwager, *Novara*-Exped., Geol. Thiel., vol. 2, 1866, p. 203, pl. 4, figs. 5a–c.—Schlumberger, Mém. Soc. Zool. France, vol. 4, 1891, p. 165, pl. 9, figs. 52–54, text figs. 8, 9.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 75, pl. 28, fig. 3; pl. 29, fig. 1.

*Biloculina depressa* d'Orbigny, var. *murrhyna* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 146, pl. 2, figs. 10, 11.

This species is represented by a few specimens at but six stations, all but one, D5446, east coast of Luzon, in the region to the south, where it occurs in Sibuko Bay, Borneo; south of Patiente Strait; Molluca Sea; and the Gulf of Boni. These stations are all in comparatively deep water, ranging from 300 to 1,560 fathoms (549 to 2,853 meters). Bottom temperatures are given at but three stations—38.3° F., 38.7° F., and 44° F. (3.5° C., 3.6° C., and 6.6° C.). This is a species which occurs in deep water in most parts of the ocean.

*Biloculina murrhyna*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13473 | U.S.N.M. | 1 | D5446... | 12 43 51 N.; 124 59 18 E.... | 300 | ....... | gn. m....... | Rare. |
| 13475 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E.... | 347 | 44.0 | gy. m....... | Few. |
| | | | D5632... | 1 00 00 S.; 127 50 00 E.... | 845 | ....... | ............... | Few. |
| 13474 | U.S.N.M. | 1 | D5639... | 3 54 00 S.; 123 27 20 E... | 1,560 | ....... | gy. m....... | Few. |
| 13472 | U.S.N.M. | 1 | D5652... | 4 35 00 S.; 121 23 06 E... | 525 | 38.7 | gn. m....... | Rare. |
| | | | D5654... | 3 42 00 S.; 120 45 50 E... | 805 | 38.3 | ............... | Rare. |

### BILOCULINA SERRATA L. W. Bailey.

Plate 95, figs. 3*a*, *b*.

*Biloculina serrata* L. W. BAILEY, Boston Journ. Nat. Hist., vol. 7, 1862, p. 350, pl. 8, fig. E.—SCHLUMBERGER, Feuille Jeun. Nat., vol. 13, 1883, p. 106, pl. 3, fig. 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 75, pl. 29, fig. 2.

*Biloculina depressa* D'ORBIGNY, var. *serrata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 146, pl. 2, fig. 3.

This species is very rare as far as the records show, which is similar to what I found in most of the North Pacific material.[a]

The only two stations from which it was found are D5439, west coast of Luzon, in 940 fathoms (1,719 meters); and D5639, Molucca Sea, 1,560 fathoms (2,853 meters).

This seems to be much more common in the Atlantic than in the Pacific.

*Biloculina serrata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13463 | U.S.N.M. | 1 | D5439... | 15 58 15 N.; 119 40 20 E... | 940 | 36.7 | gn. m....... | Rare. |
| 13464 | U.S.N.M. | 1 | D5639... | 3 54 50 S.; 123 27 20 E... | 1,560 | ....... | gy. m....... | Few. |

### BILOCULINA SARSII Schlumberger.

Plate 97, figs. 1*a*–*c*.

*Biloculina ringens* H. B. BRADY (not *B. ringens* Lamarck), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 142, pl. 2, fig. 7.

*Biloculina sarsi* SCHLUMBERGER, Mém. Soc. Zool. France, vol. 4, 1881, p. 166, pl. 9, figs. 55–59, text figs. 10, 11.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 76, pl. 30. fig. 2.

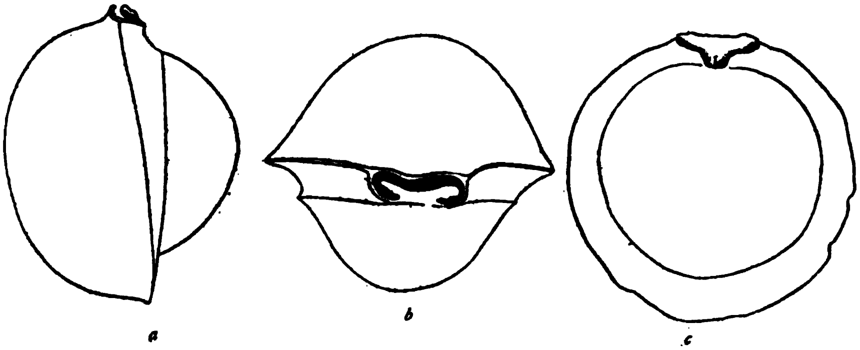


FIG. 48.—BILOCULINA SARSII SCHLUMBERGER. × 50. FROM ALBATROSS STATION D5220. *a*, FRONT VIEW; *b*, SIDE VIEW; *c*, APERTURAL VIEW OF SAME SPECIMEN.

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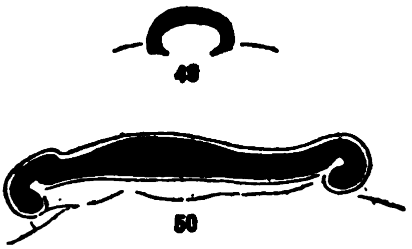
[a] Bull. 71, U. S. Nat. Mus. pt. 6, 1917, p. 76.

All the stations for this species are in the Archipelago, where it occurs at 24 stations, ranging in depth from 26 to 500 fathoms (48 to 914 meters), the average being 137 fathoms (250 meters); bottom temperatures are given in few cases, the average being 59° F. (15° C.). The stations are well scattered throughout the Archipelago.



FIGS. 49, 50.—BILOCULINA SARSII SCHLUMBERGER. 49, APERTURE OF EARLY STAGE WITH A BROAD, ROUNDED TOOTH AND AN ELLIPTICAL APERTURE. × 80. FROM ALBATROSS STATION D5178. 50, APERTURE OF AN ADULT SPECIMEN WITH VERY BROAD APERTURE, THE TOOTH VERY NARROW AND ELONGATE WITH THE ANGLES PRODUCED AT EACH END. × 100. FROM ALBATROSS STATION D5133.

*Biloculina sarsii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14646 | U.S.N.M. | 1 | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s., sh | Few. |
| | | | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Frequent. |
| | | | D5110... | 13 59 20 N.; 120 75 45 E... | 135 | 59 | dk. gy. m... | Frequent. |
| | | | D5121... | 13 27 20 N.; 121 17 45 E... | 108 | ....... | dk. gn. m... | Few. |
| | | | D5132... | Island off Panabutan Point, N. 15 W., E., 0.30 mile. | 26 | ....... | gn. m., s.... | Few. |
| 14647 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point N. 53 E., 1.50 miles. | 38 | ....... | gn. m., s.... | Common. |
| 14648 | U.S.N.M. | 10+ | D5178... | 12 43 00 N.; 122 06 15 E... | 78 | ....... | fne. s......... | Common. |
| 15775 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Rare. |
| | | | D5210... | 11 49 55 N.; 124 28 05 E... | 50 | 76.3 | fne. gy. s.... | Few. |
| | | | D5217... | 13 20 00 N.; 123 14 15 E... | 105 | 63.1 | crs. gy. s.... | Rare. |
| 14649<br>15774 | U.S.N.M.<br>U.S.N.M. | 5<br>10+ | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Frequent. |
| | | | D5255... | 7 03 00 N.; 125 39 00 E... | 100 | ....... | sft. m........ | Few. |
| 14650 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p.......... | Few. |
| | | | D5277... | 13 56 55 N.; 120 13 45 E... | 80 | 58.6 | fne. s......... | Few. |
| | | | D5296... | 13 40 09 N.; 120 57 45 E... | 210 | ....... | m., s......... | Few. |
| 14651 | U.S.N.M. | 2 | D5315... | 21 40 00 N.; 116 58 00 E... | 148 | 54.4 | s., sh........ | Few. |
| | | | D5338... | 11 23 45 N.; 119 24 45 E... | 43 | ....... | co. s., m..... | Few. |
| 14652 | U.S.N.M. | 2 | D5370... | 13 44 15 N.; 121 42 30 E... | 159 | 54.8 | sft. m........ | Few. |
| | | | D5394... | 12 00 30 N.; 124 05 36 E... | 153 | ....... | gn. m........ | Few. |
| 14653 | U.S.N.M. | 1 | D5398... | 11 35 12 N.; 124 13 48 E... | 114 | ....... | gn. m........ | Few. |
| 14654 | U.S.N.M. | 1 | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ....... | gy. m........ | Rare. |
| 14655 | U.S.N.M. | 1 | D5569... | 5 33 15 N.; 120 15 30 E... | 303 | 52.3 | co. s......... | Few. |
| | | | D5574... | 5 30 45 N.; 120 07 57 E... | 340 | ....... | ............... | Few. |
| | | | D5576... | 5 25 56 N.; 120 03 39 E... | 277 | 53.3 | s............. | Frequent. |

### BILOCULINA VESPERTILIO Schlumberger.

Plate 95, figs. 5*a*, *b*.

*Biloculina ringens* H. B. BRADY (not Lamarck), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 142, pl. 2, fig. 8.

*Biloculina vespertilio* SCHLUMBERGER, Mém. Soc. Zool. France, vol. 4, 1891, p. 174, pl. 10, figs. 74–76, text figs. 20–22.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 77, pl. 30, fig. 1; figs. 37–39 (in text).

Very fine specimens of this species occurred at *Albatross* stations D5236, east coast of Mindanao, 494 fathoms (903 meters), and D5277, China Sea, off southern Luzon, 80 fathoms (146 meters). These are the only Philippine stations; the other stations being in the area further south, where it occurs off Bouro Island; Gulf of Tomini, Celebes, and the Gulf of Boni.

*Biloculina vespertilio—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 13461 | U.S.N.M. | 1 | D5277... | 13 56 50 N.; 120 13 45 E... | 80 | 58.6 | fne. s........ | Few. |
| 13462 | U.S.N.M. | 1 | D5609... | 0 11 00 S.; 121 16 00 E... | 1,092 | 36.3 | gn. m........ | Rare. |
| 15790 | U.S.N.M. | 1 | D5637... | 3 53 20 S.; 126 48 00 E... | 700 | ....... | gy. m........ | Few. |
| | | | D5650... | 4 53 45 S.; 121 29 00 E... | 540 | 40.1 | gn. m........ | Few. |
| | | | D5658... | 3 32 40 S.; 120 31 30 E... | 510 | 41.2 | gy. m........ | Rare. |

## BILOCULINA ELONGATA d'Orbigny.

Plate 95, figs. 4*a*–*b*.

*Biloculina elongata* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 298, No. 4.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 144, pl. 2, fig. 9.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 78, pl. 31, fig. 1, fig. 40 (in text).

Typical material of this species occurred at but seven stations and only a few specimens at each. These stations range in depth from 10 to 752 fathoms (18 to 1,375 meters), the average depth 350 (640 meters); except at one station, at 10 fathoms (18 meters), the least depth is 135 (247 meters), so most of the material is from deep water. Bottom temperatures are given but for three stations, ranging from 43° to 49.8° F. (6.1° to 9.8° C.).

The localities for this species include the Sulu Archipelago, off Siasi, off Jolo; Pacific Ocean, east coast of Mindanao; Gulf of Davao; northwestern Panay; and to the southward in the Gulf of Tomini, Celebes.

*Biloculina elongata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5149... | 5 33 00 N.; 120 42 10 E... | 10 | ....... | Co., sh...... | Few. |
| 15768 | U.S.N.M. | 1 | D5238... | 7 34 45 N.; 126 38 15 E... | 380 | 43.0 | gn. m....... | Rare. |
| 15769 | U.S.N.M. | 2 | D5247... | 7 02 00 N.; 125 38 45 E... | 135 | ....... | m........... | Rare. |
| | | | D5259... | 11 57 30 N.; 121 42 15 E... | 312 | 49.3 | gy. m., glob. | Few. |
| 13454 | U.S.N.M. | 1 | D5423... | 9 38 30 N.; 121 11 00 E... | 508 | 49.8 | gy. m., co. s. | Few. |
| 13455 | U.S.N.M. | 1 | D5449... | 13 21 36 N.; 124 00 30 E... | 300 | ....... | .............. | Few. |
| 13453 | U.S.N.M. | 1 | D5613... | 0 42 00 S.; 121 44 00 E... | 752 | ....... | gy. m....... | Few. |

### BILOCULINA GLOBULUS Bornemann.

Plate 95, figs. 2*a*, *b*.

*Biloculina globulus* Bornemann, Zeitschr. deutsch. geol. Ges., vol. 7, 1855, p. 349, pl. 19, fig. 3.—Schlumberger, Mém. Soc. Zool. France, vol. 4, 1891, p. 188, pl. 12, figs. 97–100, figs. in text, 42–44.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 78, pl. 31, fig. 2.

A few specimens occurred at 11 different stations in the region. These ranged in depth from 32 to 752 fathoms (59 to 1,375 meters), the average depth being 373 fathoms (682 meters). Bottom temperatures at four of these stations ranged from 44° F. to 73.8° F. (6.6° C. to 23.2° C.), the average being 57.5° F. (14.2° C.). Most of the stations are from 300 to 500 fathoms (549 to 914 meters).

These are off northern Cebu; Verde Island Passage; China Sea, off Formosa; Mindoro Strait; Palawan Passage; east coast of Luzon, and to the southward in Darvel and Sibuko Bays, Borneo; Gulf of Tomini, Celebes; and south of Patiente Strait.

*Biloculina globulus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s........ | Few. |
| 13480 | U.S.N.M. | 1 | D5268... | 13 42 00 N.; 120 57 15 E... | 170 | ....... | s., p......... | Few. |
| 13477 | U.S.N.M. | 2 | D5318... | 21 32 00 N.; 117 46 00 E... | 340 | ....... | s., br. Co .... | Few. |
| 13476 | U.S.N.M. | 1 | D5333... | 12 26 30 N.; 120 37 45 E... | 310 | 73.8 | s............ | Few. |
| 13484 | U.S.N.M. | 1 | D5348... | 10 57 45 N.; 118 38 15 E... | 375 | 56.4 | co., s........ | Few. |
| | | | D5467... | 13 35 27 N.; 123 37 18 E... | 480 | ....... | gy. m....... | Few. |
| 13483 | U.S.N.M. | 2 | D5468... | 13 35 39 N.; 123 40 28 E... | 569 | ....... | gn. m....... | Few. |
| 13478 | U.S.N.M. | 1 | D5580... | 4 52 45 N.; 119 06 45 E... | 162 | 55.8 | br. s., Co. ... | Few. |
| 13475 | U.S.N.M. | 1 | D5586... | 4 06 50 N.; 118 47 20 E... | 347 | 44.0 | gy. m....... | Few. |
| 13479 | U.S.N.M. | 1 | D5613... | 0 42 00 N.; 121 44 00 E... | 752 | ....... | gy. m....... | Few. |
| 13481 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 06 00 E .. | 569 | ....... | co. s., m..... | Few. |

### BILOCULINA ANOMALA Schlumberger.

Plate 96, figs. 1*a*–*c*.

*Biloculina anomala* Schlumberger, Mém. Soc. Zool. France, vol. 4, 1891, p. 182, pl. 11, figs. 84–86; pl. 12, fig. 101; text figs. 32–34.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 79, pl. 32, fig. 1.

There are but three records for this species; D5201, Sogod Bay, southern Leyte, in 554 fathoms (1,012 meters); D5622, between Gillolo and Makyan, in 275 fathoms (503 meters); and H4898, Sulu Sea, off western Mindanao, 221 fathoms (405 meters).

Schlumberger's material was from the Gulf of Marseilles, and I have recorded this species in the North Pacific, off the Hawaiian Islands.

From these records it is probably found in the general Indo-Pacific region in comparatively deep water.

*Biloculina anomala—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy. s., m.... | Rare. |
| 13457 | U.S.N.M. | 1 | D5622... | 0 19 20 N.; 127 28 30 E... | 275 | ....... | gy. m....... | Rare. |
| 15776 | U.S.N.M. | 1 | D4898... | 7 43 45 N.; 122 03 45 E... | 221 | ....... | gy. m. glob.. | Rare. |

## BILOCULINA LUCERNULA Schwager.

Plate 97, figs. 2*a–c;* pl. 98, figs. 1*a–c*.

*Biloculina lucernula* Schwager, *Novara*-Exped., Geol. Theil., vol. 2, 1866, p. 202, pl. 4, figs. 14*a*, *c*, 17*a*, *b*.—Schlumberger, Mém. Soc. Zool. France, vol. 4, 1891, p. 185, pl. 12, figs. 90–96; text figs. 37–41.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 79, pl. 32, fig. 2.

*Biloculina tubulosa* H. B. Brady (not Costa), Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 147, pl. 3, figs. 6, 14.

There is but one station for the typical form of this species—D5630, south of Patiente Strait, in 569 fathoms (1,040 meters). The triloculine form occurs at D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters).

This species, described by Schwager from Kar Nicobar Island, is evidently widely spread in the Indo-Pacific, and probably elsewhere although it has not been common in this material.

I have had it in the Pacific from the western coast of America and the Hawaiian Islands.

*Biloculina lucernula—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15771 | U.S.N.M. | 5 | D5236... | 8 50 45 N.; 126 26 52 E... | 494 | 41.2 | fne. gy. s.... | Few. |
| 13458 | U.S.N.M. | 1 | D5630... | 0 56 30 S.; 128 05 00 E .. | 569 | ....... | co. s., m..... | Rare. |

## BILOCULINA PISUM Schlumberger.

*Biloculina pisum* Schlumberger, Mém. Soc. Zool. France, vol. 4, 1891, p. 569, pl. 11, figs. 81–83; fig. 31 (in text).—Chapman, Trans. New Zealand Inst., vol. 38, 1905, p. 80.

Specimens, apparently this species, occur at a single station D5121, east coast of Mindoro, in 108 fathoms (198 meters).

Schlumberger described this from the Mediterranean; Chapman records it from off Great Barrier Island, New Zealand; and I have had it from the Poor Knights Islands, in the same general region.

*Biloculina pisum—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 15772 | U.S.N.M. | 1 | D5121... | 13 27 20 N.; 121 17 45 E.. | 108 | ....... | dk. gn. m.... | Few. |

### BILOCULINA DENTICULATA (H. B. Brady).

Plate 98, figs. 3*a*, *b*.

*Biloculina ringens* (Lamarck), var. *denticulata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 143, pl. 3, figs. 4, 5.

*Biloculina denticulata* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 80, pl. 33, fig. 1.

This species, which was described by Brady as a variety of *Biloculina ringens*, I placed as a definite species (reference above).

It is evidently a shallow-water, tropical species, in its best development in the Indo-Pacific region, where it occurs from the Hawaiian Islands, west to the Indian Ocean.

In the Philippines it has occurred at 11 stations, all in shallow water, ranging in depth from 10 to 100 fathoms (18 to 183 meters), the average depth 33 fathoms (60 meters). The bottom temperature is given at but one of these stations, that from 37 fathoms (68 meters), where it is 75.7° F. (24.2°C.), showing that *all* the records for this species, except perhaps that one at 100 fathoms (183 meters), are in warm waters.

At the one station D5179, off Romblon in 37 fathoms (68 meters), it is very abundant.

*Biloculina denticulata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13466 | U.S.N.M. | 10+ | D5134 .. | 6 44 45 N.; 121 48 00 E.. | 25 | ....... | fne. s ........ | Common. |
| 15781 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E.. | 19 | ....... | s., Co ....... | Rare. |
| | | | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co. s ........ | Rare. |
| 13468 | U.S.N.M. | 9 | D5159... | 5 11 50 N.; 119 54 00 E.. | 10 | ....... | co. s ........ | Common. |
| 15782 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E.. | 16 | ....... | fne. s ........ | Rare. |
| 13470 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd. s........ | Abundant. |
| 13465 | U.S.N.M. | 1 | D5218... | 13 11 15 N.; 123 02 45 E.. | 20 | ....... | crs. s ........ | Common. |
| 15783 | U.S.N.M. | 1 | D5255... | 7 03 00 N.; 125 39 00 E.. | 100 | ....... | sft. m........ | Rare. |
| 13469 | U.S.N.M. | 1 | D5342... | 10 56 55 N.; 119 17 24 E.. | 14–25 | ....... | gy. m........ | Rare. |
| 13467 | U.S.N.M. | 1 | .......... | Jolo Jolo, P. I.............. | ....... | ....... | .............. | Frequent. |
| 13157 | U.S.N.M. | 3 | .......... | Apra Bay, Guam............ | ....... | ....... | .............. | Few. |

### BILOCULINA DENTICULATA (H. B. Brady), var. STRIOLATA H. B. Brady.

Plate 98, figs. 2*a*–*c*.

*Biloculina ringens* (Lamarck), var. *striolata* H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 143, pl. 3, figs. 7, 8.—Millett, Journ. Roy. Micr. Soc., 1898, p. 262, pl. 5, fig. 8.

*Biloculina denticulata*, var. *striolata* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 80, pl. 33, figs. 2, 3.

This variety is much less common than the typical form of the species, occurring at but five stations in the region D5139, off Jolo in 20 fathoms (37 meters); D5141, the neighboring station, 29 fathoms (53 meters); D5159, off Tawi Tawi in 10 fathoms; D5179, off Romblon in 37 fathoms (168 meters); and from the exterior of a pearl oyster from Jolo Jolo.

Evidently the variety is like the typical form in being most at home in shallow, warm water.

*Biloculina denticulata*, var. *striolota*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 13471 | U.S.N.M. | 10+ | D5139... | 6 06 00 N.; 121 02 30 E.. | 20 | ....... | co.s.......... | Few. |
| | | | D5141... | 6 09 00 N.; 120 58 00 E.. | 29 | ....... | co.s.......... | Common. |
| | | | D5159... | 50 11 50 N.; 119 54 00 E.. | 10 | ....... | co.s.......... | Rare. |
| | | | D5179... | 12 38 15 N.; 122 12 30 E.. | 37 | 75.7 | hrd.s........ | Few. |
| | | | .......... | Jolo Jolo, P. I............. | ....... | ....... | ............... | Rare. |

### BILOCULINA COMATA H. B. Brady.

Plate 96, figs. 3*a*, *b*.

*Biloculina comata* H. B. Brady, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 45; Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 144, pl. 3, figs. 9*a*, *b*.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 81, pl. 34, fig. 1.

As known elsewhere this species occurs only in waters of considerable depth. Specimens occurred at 21 stations, ranging in depth from 50 to 901 fathoms (91 to 1,648 meters), the average being 375 fathoms (686 meters). Bottom temperatures range from 38.2° to 59.6° F. (3.4° to 15.3° C.), the average being 51° F (10.5° C.).

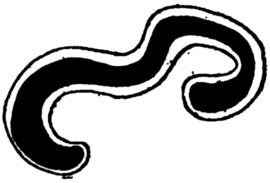


Fig. 51.—Biloculina comata H. B. Brady. × 100. Aperture of specimen from Albatross station D5236.

The only stations at which this species is at all frequent range from 256 to 494 fathoms (468 to 903 meters).

These localities include stations in the Philippine region and about the Sulu Sea, off western Mindanao, and off Tawi Tawi; Sogod Bay, southern Leyte, between Marinduque and Luzon; Pacific Ocean, east coast of Mindanao; off northwestern Panay, China Sea, off southern Luzon and Formosa; between Siquijor and Bohol; between Negros and Siquijor; and several stations to the southward in Darvel and Sibuko Bays, Borneo; south of Patiente Strait; Gulf of Boni; and Macassar Strait.

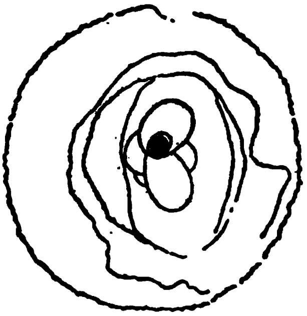


FIG. 52.—BILOCULINA COMATA H. B. BRADY. OUTLINE OF THE CHAMBERS OF A PARTIALLY BROKEN SPECIMEN, SHOWING THE EARLY QUINQUELOCULINE STAGE WITH NEARLY SMOOTH CHAMBERS. × 100. FROM ALBATROSS STATION D5236.

Some of the stations show the triloculine form which has already been referred to under *Triloculina insignis*, and which has been confused by various writers under that name.

*Biloculina comata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13447 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E.. | 554 | 52.8 | gy. s., m.... | Rare. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E.. | 50 | ....... | sft. gn. m... | Few. |
| 13442 | U.S.N.M. | 1 | D5222... | 13 38 30 N.; 121 42 45 E.. | 195 | 52.8 | gn. m....... | Rare. |
| 15778 | U.S.N.M. | 10 | D5236... | 8 50 45 N.; 126 26 52 E.. | 494 | 41.2 | fne. gy. s.... | Frequent. |
| 13450 | U.S.N.M. | 2 | D5259... | 11 57 30 N.; 121 42 15 E.. | 312 | 49.3 | gy. m., glob. | Few. |
| | | | D5278... | 14 00 10 N.; 120 17 15 E.. | 102 | 50.6 | fne. s., m., sh | Few. |
| | | | D5318... | 21 32 00 N.; 117 46 00 E.. | 340 | ....... | s., br. Co.... | Few. |
| | | | D5537... | 9 11 00 N.; 123 23 00 E.. | 254 | 53.5 | gn. m....... | Frequent. |
| 13451 | U.S.N.M. | 5 | D5529... | 9 23 45 N.; 123 39 30 E.. | 441 | 53.0 | gy. m., glob. | Frequent. |
| | | | D5538... | 9 08 15 N.; 123 23 20 E.. | 256 | 53.3 | gn. m., s.... | Frequent. |
| 13446 | U.S.N.M. | 3 | D5567... | 5 48 00 N.; 120 33 45 E.. | 268 | 52.0 | fne. s........ | Few. |
| 13443 | U.S.N.M. | 2 | D5668... | 2 28 15 S.; 118 49 00 E.. | 901 | 38.2 | gy. m....... | Few. |
| 13448 | U.S.N.M. | 2 | D5650... | 4 53 45 S.; 121 29 00 E.. | 540 | 40.1 | gn. m....... | Few. |
| | | | D5630... | 0 56 30 S.; 128 05 00 E.. | 509 | ....... | co. s., m.... | Few. |
| 13452 | U.S.N.M. | 4 | D5591... | 4 11 48 N.; 118 38 20 E.. | 260 | ....... | ............... | Few. |
| 13441 | U.S.N.M. | 1 | D5582... | 4 19 54 N.; 118 58 38 E.. | 890 | 38.3 | gy. m., fne. s. | Few. |
| 15779<br>13445 | U.S.N.M.<br>U.S.N.M. | 6<br>5 | D5585... | 4 07 00 N.; 118 49 54 E.. | 476 | 41.1 | gy. m....... | Common. |
| 13444 | U.S.N.M. | 2 | D5586... | 4 06 50 N.; 118 47 20 E.. | 347 | 44.0 | gy. m....... | Few. |
| 13449 | U.S.N.M. | 1 | D5589... | 4 12 10 N.; 118 38 08 E.. | 260 | 45.7 | fne. gy. s., gy. m. | Few. |
| | | | D5425... | 9 37 45 N.; 121 11 00 E (triloculine form). | 495 | 49.4 | gy. m., co. s. | Rare. |
| 15780 | U.S.N.M. | 1 | H4898... | 7 43 45 N.; 122 08 45 E.. | 221 | ....... | gy. m., glob. | Rare. |

### BILOCULINA MILLETTII Cushman.

*Miliolina durrandii* Millett (part), Journ. Roy. Micr. Soc., 1898, p. 268, pl. 6, figs. 8–10 (not figure 7).—Heron-Allen and Earland, Trans. Zool. Soc. London, vol. 20, 1915, p. 565, pl. 42, figs. 11–16.

*Biloculina millettii* Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 81, pl. 34, figs. 4, 5.

This species, described from the Malay region by Millett, and which I also found in Hongkong Harbor, has occurred in the Philippine region at one station. It is evidently characteristic of this rather limited region.

Heron-Allen and Earland record this in their paper from the Kerimba Archipelago, and also note its occurrence "from the coasts of Burma, Queensland, Java, and Macassar in the eastern seas; and in the Pacific is very abundant, and typical at Tahiti."

This species seems to be without an apertural tooth, none having occurred in our specimen, and Heron-Allen and Earland mention the same characteristic.

*Biloculina millettii—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 15773 | U.S.N.M. | 1 | D5210... | 11° 49′ 55″ N.; 124° 28′ 05″ E.. | 50 | ° F.<br>76.3 | fne. gy. s.... | Rare. |

### BILOCULINA IRREGULARIS d'Orbigny.

Plate 95, figs. 1*a*–*b*.

*Biloculina irregularis* d'Orbigny, Foram. Amér. Mérid., 1839, "Foraminifères," p. 67, pl. 8, figs. 22–24.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 140, pl. 1, figs. 17, 18.

This rather widely distributed species in comparatively deep water is recorded by Brady from three South Pacific stations, ranging in depth from 610 to 1,070 fathoms (1,116 meters to 1,957 meters), off Fiji, off Tahiti, and north of New Guinea. Numerous specimens have occurred at a single station in the Philippine dredgings—D5236, Pacific Ocean, east coast of Mindanao, in 494 fathoms (903 meters); bottom temperature, 41.2° F. (5.1° C.).

*Biloculina irregularis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| 15770 | U.S.N.M. | 5 | D5236... | 8° 50′ 45″ N.; 126° 26′ 52″ E.. | 494 | ° F.<br>41.2 | fne. gy. s.... | Few. |

## Genus NEVILLINA Sidebottom, 1905.

*Nevillina* Sidebottom (Type *N. coronata* (Millett)), Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, pt. 2, No. 11, 1905, p. 1.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 83.

This very interesting genus has been discussed at some length in the references given above.

### NEVILLINA CORONATA (Millett).

Plate 99, figs. 1*a*, *b*.

*Biloculina coronata* Millett, Journ. Roy. Micr. Soc., 1898, p. 263, pl. 6, figs. 6*a*–*c*.

*Nevillina coronata* Sidebottom, Mem. Proc. Manchester Lit. Philos. Soc., vol. 49, pt. 2, No. 11, 1905, p. 1, figs. 1–8.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 84, pl. 35, figs. 2–5.

Some of the relationships of this very interesting genus and species have already been noted [47]. The species was originally discovered and described by Millett from a solitary specimen from "Asjahan, northeast coast of Sumatra," depth not given. Millett's specimen was evidently not adult, but still in the biloculine stage. Later Sidebottom described the genus *Nevillina* from more adequate material from two stations—Port Blair, east side of Andaman Island, at entrance to the port, between Ross Island and the main island in 16 fathoms (29 meters); and Sulu roadstead, 12 fathoms (22 meters). These two stations with that of Millett show that the species must have a wide distribution in the Indo-Pacific.

In the Philippine material it is very rare. A single apertural end of a fully developed specimen is from D5142, off Jolo, in 21 fathoms (39 meters); and two specimens, also fully mature and very typical, from D5160, off Tinakta Island, Sulu Archipelago, Tawi Tawi Group, in 12 fathoms (22 meters).

When sufficient material of this species can be obtained the early development of the microspheric form should be studied and compared with the sections figured by Schlumberger of the genera *Idalina* and *Periloculina*.

This is evidently one of the most interesting Foraminifera of the region, representing a species with Cretaceous affinites still existing in the Indo-Pacific region.

*Nevillina coronata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 13584 | U.S.N.M. | 1 | D5142... | 6 06 10 N.; 121 02 40 E.. | 21 | ....... | co. s., sh.... | Rare. |
| 13585 | U.S.N.M. | 2 | D5160... | 5 12 40 N.; 119 55 10 E.. | 12 | ....... | s........... | Rare. |

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[47] Cushman, 1917, pp. 83.84.

### Genus PENEROPLIS Montfort, 1808.

This genus occurs in numerous forms in the area, and the same arrangement as that adopted by Heron-Allen and Earland in their paper on the Kerimba Archipelago is here adopted. They, having made an extended study of the earlier figures and descriptions, have given a very valuable series of notes on the systematic arrangement of the forms of this genus. Their paper is here referred to so that their disposition of the species may be followed.

#### PENEROPLIS PERTUSUS (Forskål).

*Nautilus pertusus* FORSKÅL, Descr. Anim., 1775, p. 125, No. 65.

*Peneroplis pertusus* JONES, PARKER, and H. B. BRADY, Foram. Crag., 1865, p. 19.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 204, pl. 13, figs. 16, 17.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 601.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 86, pl. 36, fig. 1; pl. 37, figs. 1, 2, 6.

This typical form of the species is not the most abundant in the region. There are records from four stations: Sulu Archipelago; off Tawi Tawi; between Burias and Luzon; and Midway Island. It undoubtedly occurs, as do the other forms, in shallow water throughout the region.

*Peneroplis pertusus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° *F.* | | |
| 14660 | U.S.N.M. | 3 | D5154 | 5 14 50 N.; 119 58 45 E. | 12 | | co. s. | Few. |
| 14661 | U.S.N.M. | 1 | D5159 | 5 11 50 N.; 119 54 00 E. | 10 | | co. s. | Few. |
| 14662 | U.S.N.M. | 10+ | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s. | Common. |
| 14663 | U.S.N.M. | 2 | | Midway Island | | | | Few. |

#### PENEROPLIS PLANATUS (Fichtel and Moll.)

*Nautilus (Lituus) arietinus* (part) BATSCH, Conch. des Seesandes, 1791, p. 4, pl. 6, figs. 15*a*, *b*.

*Nautilus planatus*, var. β FICHTEL and MOLL, Test. Micr., 1803, p. 91, pl. 16, figs. 1*d*, *e*, *f*.

*Peneroplis planatus* D'ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 285, No. 1.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 204, pl. 13, fig. 15.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 601.

*Peneroplis pertusus*, var. *planatus* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 87, pl. 37, fig. 3.

This is the most common form, being very abundant at a few of the shallow-water stations, and occurring in lesser numbers than others. The stations range in depth from 12 to 78 fathoms (22 to 143 meters), the average being about 30 fathoms (55 meters). Bottom temperatures are not given.

Most of the stations are in the shallow, warm waters about the islands of the Sulu Sea.

*Peneroplis planatus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° F. | | |
| 14668 | U.S.N.M. | 5 | D5133... | Island off Panabutan Point N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Common. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 14669 | U.S.N.M. | 1 | D5139... | 6 06 00 N.; 121 02 30 E... | 20 | ....... | co. s......... | Few. |
| 14670 | U.S.N.M. | 1 | D5152... | 5 22 55 N.; 120 15 45 E... | 34 | ....... | wh. s......... | Few. |
| 14671 | U.S.N.M. | 3 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............ | Few. |
| 14672 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s......... | Few. |
| 14673 | U.S.N.M. | 2 | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m......... | Few. |
| 14674 | U.S.N.M. | 1 | D5178... | 12 43 00 N., 122 06 15 E... | 78 | ....... | fne. s......... | Few. |
| 14675 | U.S.N.M. | 2 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Few. |
| 14676 | U.S.N.M. | 1 | D5206... | 11 31 40 N.; 124 42 40 E... | 32 | ....... | gn. m......... | Few. |
| 14677 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Common. |
| 14678 | U.S.N.M. | 1 | .......... | Binang Pool, Subin Bay, P. I. | ....... | ....... | ............... | Few. |
| 14679 | U.S.N.M. | 3 | .......... | Tacloban Anchorage, P. I. | ....... | ....... | ............... | Common. |

### PENEROPLIS CARINATUS d'Orbigny.

*Peneroplis carinatus* D'ORBIGNY, Foram. Amér. Mérid., 1839, "Foraminifères," p. 33, pl. 3, figs. 7, 8.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 205, pl. 13, fig. 14.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 602.

*Peneroplis pertusus*, var. *carinatus* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 87, pl. 37, fig. 4.

This species is common at D5159, off Tawi Tawi, in 10 fathoms (18 meters).

*Peneroplis carinatus—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 4658 | U.S.N.M. | 10+ | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Common. |

### PENEROPLIS ARIETINUS (Batsch).

*Nautilus* (*Lituus*) *arietinus* (part) BATSCH, Conch. des Seesandes, 1791, p. 4, pl. 6, fig. 15c.

*Peneroplis arietinus* PARKER, JONES, and H. B. BRADY, Ann. Mag. Nat. Hist., ser. 3, vol. 16, 1865, p. 26, pl. 1, fig. 18.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 204, pl. 13, figs. 18, 19, 22.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 602.

*Peneroplis pertusus*, var. *arietinus* CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 88, pl. 36, fig. 2; pl. 37, fig. 5.

The elongate form is common at some stations, the depths at which it was recorded being between 10 and 20 fathoms (18 and 37 meters), mostly among the islands in the Sulu region.

*Peneroplis arietinus—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14664 | U.S.N.M. | 4 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Common. |
| 14665 | U.S.N.M. | 5 | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Few. |
| 14666 | U.S.N.M. | 5 | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s......... | Common. |
| 14667 | U.S.N.M. | 1 | .......... | Midway Island.......... | ...... | ....... | .............. | Rare. |
| 13156 | U.S.N.M. | 1 | .......... | Manila Bay.............. | ...... | ....... | .............. | Rare. |

### PENEROPLIS CYLINDRACEUS (Lamarck).

*Nautilus acicularis* BATSCH, Conch. des Seesandes, 1791, p. 4, pl. 6, figs. 16 *a*, *b*.
*Spirolinites cylindracea* LAMARCK, Ann. du Mus., vol. 5, 1804, p. 245; vol. 8, 1806, pl. 62, fig. 16.
*Peneroplis cylindraceus* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 205, pl. 13, figs. 20, 21.—HERON-ALLEN and EARLAND, Trans. Zool. Soc. London, vol. 20, 1915, p. 602.

This elongate cylindrical species has occurred at *Albatross* station D5192, off northern Cebu, in 32 fathoms (59 meters).

*Peneroplis cylindraceus—Material examined.*

| Cat. No. | Coll. of— | No. of speci-mens. | Station. | Locality. | Depth in fath-oms. | Bot-tom tem-pera-ture. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| 14659 | U.S.N.M. | 1 | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Few. |

## Genus ORBICULINA Lamarck, 1816.

### ORBICULINA ADUNCA (Fichtel and Moll).

*Nautilus aduncus* FICHTEL and MOLL, Test. Micr., 1803, p. 115, pl. 23.
*Orbiculina adunca* LAMARCK, Tabl. Encycl. et Meth., 1816, pl. 468, figs. 2 *a–c*.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 209, pl. 14, figs. 1-13.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1917, p. 91, pl. 37, figs. 7, 8.

I have found this species at but two stations in the Philippine region—D5158 and D5164, Sulu Archipelago, off Tawi Tawi, in 12 and 18 fathoms (22 and 33 meters). The species is rare at both stations.

Brady records this from about the various East Indian Islands, but I have failed to find it in the North Pacific except at one station. It did not occur in the material I had from about the Hawaiian Islands, and it seems to be very rare in the Indo-Pacific, being replaced by various species of *Orbitolites*. Dakin records it as rare from the Gulf of Mannan, Ceylon. Heron-Allen and Earland do not record it from the Kerimba Archipelago.

*Orbiculina adunca*—*Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | °F. | | |
| | | | D5158... | 5 12 00 N.; 119 54 30 E... | 12 | ....... | crs. s., sh.... | Rare. |
| | | | D5164... | 5 01 40 N.; 119 52 20 E... | 18 | ....... | gn. m....... | Rare. |

## Genus ORBITOLITES Lamarck.

### ORBITOLITES MARGINALIS (Lamarck).

*Orbulites marginalis* Lamarck, Hist. Nat. Anim. sans Vert., vol. 2, 1816, p. 196, No. 1.

*Orbitolites marginalis* Carpenter, Philos. Trans., 1856, p. 192, pl. 9, figs. 1-4.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 214, pl. 15, figs. 1-5.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1915, p. 92, pl. 38, figs. 1, 2.

In the reference last referred to I have figured and described the young stages of the three common species of *Orbitolites*. Heron-Allen and Earland in their paper, "The Kerimba Archipelago Foraminifera," note the difficulties of distinguishing this species and the following (*O. duplex*) simply on the basis of the single or double series of marginal pores. The same holds true of the Philippine material, where both species often occur together in various stages of development. In such cases the early development is a much more accurate character to distinguish the species, especially in the megalospheric form. As noted in the above reference on the North Pacific, *O. marginalis* has a series of several Orbiculine chambers with single apertures and before divisions occur in the chambers has developed to a decidedly crozier-shaped test. Before true annular chambers are developed the test attains a considerable size. Throughout the test there is a single layer of chambers unless toward the edge there may be a tendency toward *O. duplex* and a double series of pores developed.

*O. duplex*, on the other hand, has a much more accelerated development as there figured, and the crozier-shape is attained almost at once and annular chambers are developed very early. The double tier of chambers also is developed early, but their apertures may for some time all be in a single series in the middle of the border.

As also noted by Heron-Allen and Earland, *O. duplex* is much more prone to exhibit excess developments of shell material in the form of extra plates than *O. marginalis*.

Where living material was preserved all three species show a decided greenish color, due to the presence of symbyotic algae. These were perhaps most marked in *O. complanata*.

As a rule the chamber walls of *O. marginalis* are thinner than in the other species giving a characteristic bluish tinge to the test not usually noticed in either of the other species.

*O. marginalis* was less common than *O. duplex*, but more so than *O. complanata* except in very shallow water. It is abundant at many of the stations usually in shallow water but in a few cases found at more than 500 fathoms (914 meters).

It seems to be most common among the islands rather than on the open outer shores. To the southward it was found between Gillolo and Kayoa.

*Orbitolites marginalis—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15792 | U.S.N.M. | 1 | D5097... | 14 19 15 N.; 120 33 52 E... | 30 | ....... | gy. m., s., sh | Few. |
| 15793 | U.S.N.M. | 1 | D5100... | 14 17 15 N.; 120 32 40 E... | 35 | ....... | gy. s......... | Few. |
| 15794 | U.S.N.M. | 1 | D5105... | 14 43 55 N.; 120 12 50 E... | 25 | ....... | .............. | Few. |
| 15795 | U.S.N.M. | 5 | D5132... | Island off Panabutan Point, N. 15° W., 0.30 mile. | 26 | ....... | gn. m., s..... | Few. |
| 15796 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Point, N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Abundant. |
| 15797 | U.S.N.M. | 1 | D5138... | 6 06 00 N.; 120 58 50 E... | 19 | ....... | s., Co........ | Few. |
| 15798 | U.S.N.M. | 10+ | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Common. |
| 15799 | U.S.N.M. | 4 | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............. | Few. |
| | | | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gr. m......... | Few. |
| | | | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Few. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft. gn. m.... | Few. |
| 15800 | U.S.N.M. | 1 | D5244... | 6 52 05 N.; 126 14 15 E... | 171 | ....... | gy. m......... | Few. |
| 15801 | U.S.N.M. | 1 | D5257... | 7 22 12 N.; 124 12 15 E... | 28 | ....... | m............. | Few. |
| | | | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh., p., s..... | Few. |
| | | | D5382... | 13 15 20 N.; 122 45 30 E... | 128 | ....... | m............. | Few. |
| | | | D5388... | 12 51 30 N.; 123 26 15 E... | 226 | 51.4 | sft. gn. m.... | Few. |
| | | | D5408... | 10 40 15 N.; 124 15 00 E... | 159 | 55.4 | gn. m......... | Few. |
| | | | D5419... | 9 58 30 N.; 123 46 00 E... | 175 | 54.5 | gn. m......... | Few. |
| | | | D5424... | 9 37 05 N.; 121 12 37 E... | 340 | 50.4 | co. s......... | Few. |
| 15802 | U.S.N.M. | 3 | D5529... | 9 23 45 N.; 123 39 30 E... | 441 | 53.0 | gy. m., glob . | Few. |
| | | | D5465... | 13 39 42 N.; 123 40 39 E... | 500 | ....... | gy. m......... | Few. |
| | | | D5469... | 13 36 48 N.; 123 38 24 E... | 500 | ....... | gn. m......... | Few. |
| | | | D5470... | 13 37 30 N.; 123 41 09 E... | 560 | ....... | m............. | Few. |
| | | | D5627... | 0 06 00 N.; 127 26 00 E... | 22 | ....... | m............. | Few. |
| 15804 | U.S.N.M. | 1 | .......... | Tayabas Gulf, P. I........ | ...... | ....... | .............. | Few. |
| 15803 | U.S.N.M. | 1 | .......... | Siasi Island, P. I.......... | ...... | ....... | .............. | Few. |

### ORBITOLITES DUPLEX Carpenter.

*Orbitolites*, duplex type CARPENTER, Philos. Trans., 1856, p. 120, pl. 5, fig. 10; pl. 9, fig. 10.

*Orbitolites duplex* CARPENTER, Rep. *Challenger*, "Orbitolites," 1883, p. 25, pl. 3, figs. 8–14; pl. 4, figs. 6–10; pl. 5, figs. 1–10.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 216, pl. 16, fig. 7.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1916, p. 94, pl. 38, figs. 3, 4; pl. 39, fig. 1.

This species is represented at a greater number of stations than either of the others as far as our material shows. Depths range from 10 to 732 fathoms (18 to 1,339 meters). It is most common in fairly shallow water among the islands of the Archipelago, but occurred in Darvel and Sibuko Bays, Borneo. Most of the stations were at depths of less than 100 fathoms (183 meters); eight between 100 and 200 fathoms (183 and 366 meters); five between 200 and 300 fathoms (366 and 549 meters); six between 300 and 400 fathoms (549 and 732 meters); five above 400 fathoms (732 meters). At the deeper stations the species was usually represented by few specimens.

Numerous specimens formed of fused individuals were found, two or more with the earlier annular chambers having fused into a complete annular growth.

*Orbitolites duplex—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15805 | U.S.N.M. | 1 | D5106 | 14 23 55 N.; 120 32 33 E. | 37 | | gy. m. | Few. |
| 15806 | U.S.N.M. | 4 | D5110 | 13 59 20 N.; 120 75 45 E. | 135 | 50.0 | dk. gy. m. | Few. |
| 15807 | U.S.N.M. | 1 | D5148 | 5 35 40 N.; 120 47 30 E. | 17 | | co. s. | Few. |
| 15808 | U.S.N.M. | 1 | D5147 | | | | | |
| 15809 | U.S.N.M. | 4 | D5149 | 5 33 00 N.; 120 42 10 E. | 10 | | Co., sh | Few. |
| 15810 | U.S.N.M. | 3 | D5154 | 5 14 50 N.; 119 58 45 E. | 12 | | co. s. | Few. |
| 15811 | U.S.N.M. | 3 | D5159 | 5 11 50 N.; 119 54 00 E. | 10 | | co. s. | Common. |
| 15812 | U.S.N.M. | 1 | D5160 | 5 12 40 N.; 119 55 10 E. | 12 | | s. | Few. |
| 15813 | U.S.N.M. | 1 | D5161 | 5 10 15 N.; 119 53 00 E. | 16 | | fne. s. | Few. |
| | | | D5201 | 10 10 00 N.; 125 04 15 E. | 554 | 52.8 | gy. s., m. | Few. |
| 15814 | U.S.N.M. | 1 | D5206 | 11 31 40 N.; 124 42 40 E. | 32 | | gn. m. | Few. |
| 15815 | U.S.N.M. | 1 | D5214 | 12 25 18 N.; 123 37 15 E. | 218 | | gn. m. | Few. |
| 15816 | U.S.N.M. | 2 | D5217 | 13 20 00 N.; 123 14 15 E. | 105 | 63.1 | crs. gy. s. | Few. |
| 15817 | U.S.N.M. | 1 | D5218 | 13 11 15 N.; 123 02 45 E. | 20 | | crs. s. | Few. |
| | | | D5220 | 13 38 00 N.; 121 58 00 E. | 50 | | sft. gn. m. | Few. |
| 15818 | U.S.N.M. | 1 | D5259 | 11 57 30 N.; 121 42 15 E. | 312 | 49.3 | gy. m., glob. | Few. |
| 15819 | U.S.N.M. | 1 | D5261 | 12 30 55 N.; 121 34 24 E. | 145 | | s., m. | Few. |
| | | | D5276 | 13 49 15 N.; 120 14 45 E. | 18 | | sh., p., s. | Common. |
| | | | D5277 | 13 56 55 N.; 120 13 45 E. | 80 | 58.6 | fne. s. | Few. |
| | | | D5278 | 14 00 10 N.; 120 17 15 E. | 102 | 59.6 | fne. s., m., sh. | Few. |
| | | | D5338 | 11 33 45 N.; 119 24 45 E. | 43 | | Co., s., m. | Few. |
| | | | D5369 | 13 48 00 N.; 121 43 00 E. | 106 | | bk. s. | Few. |
| | | | D5374 | 13 46 45 N.; 121 35 08 E. | 190 | | gy. m. | Few. |
| | | | D5381 | 13 14 15 N.; 122 44 25 E. | 88 | | co. s. | Few. |
| | | | D5388 | 12 51 30 N.; 123 26 15 E. | 226 | 51.4 | sft. gn. m. | Few. |
| | | | D5424 | 9 37 05 N.; 121 12 37 E. | 340 | 50.4 | co. s. | Few. |
| 15820 | U.S.N.M. | 1 | D5426 | 9 12 00 N.; 118 28 00 E. | 27 | | fne. gy. s. | Few. |
| | | | D5438 | 15 54 32 N.; 119 44 42 E. | 297 | 46.2 | gn. m. | Few. |
| | | | D5450 | 13 10 21 N.; 123 59 54 E. | 201 | | | Few. |
| | | | D5445 | 12 44 42 N.; 124 59 50 E. | 383 | 44.3 | gn. m., s. | Few. |
| | | | D5467 | 13 35 27 N.; 123 37 18 E. | 480 | | gn. m. | Few. |
| | | | D5469 | 13 36 48 N.; 123 38 24 E. | 500 | | gn. m. | Few. |
| | | | D5487 | 10 02 45 N.; 125 05 33 E. | 732 | 52.3 | gn. m. | Few. |
| | | | D5567 | 5 48 00 N.; 120 33 45 E. | 268 | 52.0 | fne. s. | Few. |
| | | | D5570 | 5 32 15 N.; 120 12 57 E. | 330 | 52.3 | fne. s., glob. | Few. |
| 15821 | U.S.N.M. | 5 | | Binang Pool, Subin Bay | | | | Few. |
| 15822 | U.S.N.M. | 2 | | Siasi Island | | | | Few. |
| | | | D5579 | 4 54 15 N.; 119 09 52 E. | 175 | 55.3 | fne. s., Co. | Few. |
| | | | D5580 | 4 52 45 N.; 119 06 45 E. | 162 | 55.8 | fne. s., Co. | Common. |
| | | | D5589 | 4 12 10 N.; 118 38 06 E. | 260 | 45.7 | fne. gy. s., gy. m. | Few. |
| | | | D5590 | 4 10 50 N.; 118 30 35 E. | 310 | 44.3 | gn. m., s. | Few. |
| | | | D5592 | 4 12 44 N.; 118 27 44 E. | 305 | 43.3 | gn. m. | Few. |

## ORBITOLITES COMPLANATA Lamarck.

*Orbitolites complanata* Lamarck, Syst. Anim. sans Vert., 1801, p. 376.—H. B. Brady, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 218, pl. 16, figs. 1-6; pl. 17, figs. 1-6.—Cushman, Bull. 71, U. S. Nat. Mus., pt. 6, 1916, p. 95, pl. 39, fig. 2.

Specimens of this species were abundant at many stations and at some reaching a very considerable size. Specimens of the microspheric form were found with the outer annuli more or less broken and thin, filled with numerous megalospheric young. These large specimens were of the flattened form noted by Heron-Allen and Earland from the Kerimba Archipelago. Specimens composed of fused individuals are occasionally found also. The range of depths is from 12 to 766 fathoms (22 to 1,400 meters), but two stations being greater in depth than 500 fathoms (914 meters).

*Orbitolites complanata—Material examined.*

| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | ° ′ ″ ° ′ ″ | | ° F. | | |
| 15824 | U S N M. | 1 | D5134... | 6 44 45 N ; 121 48 00 E... | 25 | ....... | fne.s........ | Few. |
| 15825 | U S N M. | 6 | D5152... | 5 22 55 N ; 120 15 45 E... | 34 | ....... | wh.s....... | Common. |
| 15826 | U.S.N.M. | 8 | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co.s.......... | Common. |
| 15827 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne.s......... | Few. |
| | | | D5191... | 10 29 45 N.; 123 31 15 E... | 258 | 62.8 | gn.m ....... | Few. |
| 15828 | U.S.N.M. | 1 | D5201... | 10 10 00 N.; 125 04 15 E... | 554 | 52.8 | gy.s.,m..... | Few. |
| | | | D5220... | 13 38 00 N.; 121 58 00 E... | 50 | ....... | sft.gn.m.... | Few. |
| 15829 | U.S.N.M. | 3 | D5272... | 14 00 00 N.; 120 22 30 E... | 118 | 57.4 | m.,sh.,co.s.. | Few. |
| | | | D5276... | 13 49 15 N.; 120 14 45 E... | 18 | ....... | sh.,p.,s..... | Few. |
| | | | D5374... | 13 46 45 N.; 121 35 08 E... | 190 | ....... | gy.m........ | Few. |
| | | | D5381... | 13 14 15 N.; 122 44 25 E... | 88 | ....... | sml.co.s.... | Few. |
| | | | D5429... | 9 41 30 N.; 118 50 22 E... | 766 | ....... | gn.m......... | Few. |
| | | | D5567... | 5 48 00 N.; 120 33 45 E... | 268 | 62.0 | fne.s......... | Few. |
| | | | D5569... | 5 83 15 N.; 120 15 30 E... | 303 | 52.3 | co.s.......... | Few. |
| | | | D5571... | 5 80 45 N.; 120 07 57 E... | 340 | 52.3 | s.,sh........ | Few. |
| 15830 | U.S.N.M. | 1 | .......... | Siasi Strait, P. I ......... | ....... | ....... | .............. | Rare. |
| 12155 | U.S.N.M. | 2 | .......... | Canagan Island, P. I...... | ....... | ....... | .............. | Rare. |
| 15831 | U.S.N.M. | 2 | .......... | Tara Island, P. I.......... | ....... | ....... | .............. | Rare. |

### ORBITOLITES COMPLANATA Lamarck, var. PLICATA (Dana).

*Marginopora vertebralis* BLAINVILLE, var. *plicata* DANA, U. S. Exploring Expedition, vol. 7, 1846, p. 706, pl. 60, fig. 9.

*Orbitolites laciniatus* H. B. BRADY, Quart. Journ. Micr. Sci., vol. 21, 1881, p. 47.

*Orbitolites complanata* LAMARCK, var. *laciniata* H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 220, pl. 16, figs. 8–11.

Heron-Allen and Earland note the identity of Dana's variety with that of Brady.[48]

It occurs at a few stations in shallow water with the outer annuli containing megalospheric young.

## Genus ALVEOLINA d'Orbigny, 1826.

### ALVEOLINA BOSCII (Defrance).

Plate 99, figs. 2–5.

"Alveolites" DEFRANCE, Dict. Sci. Nat., vol. 1, 1816, p. 557.

*Oryzaria boscii* DEFRANCE, Dict. Sci. Nat., vol. 16, 1820, p. 104.

*Alveolina boscii* D' ORBIGNY, Ann. Sci. Nat., vol. 7, 1826, p. 306, No. 5, Modèles, 1826, No. 50.—H. B. BRADY, Rep. Voy. *Challenger*, Zoology, vol. 9, 1884, p. 222, pl. 17, figs. 7–12.—CHAPMAN, Journ. Roy. Micr. Soc., 1908, p. 151–153, pls. 2, 3.—CUSHMAN, Bull. 71, U. S. Nat. Mus., pt. 6, 1916, p. 98, pl. 39, fig. 30.

One of the interesting facts of distribution noted in the study of the Philippine material is the abundance of *A. boscii* and the entire absence as far as our material shows of *A. melo*. Both species occur off the Hawaiian Islands in shallow water. In the Malay region Millett notes the rarity of *A. melo*, occurring at but two stations, while *A. boscii* was more or less scattered over the area. In the Kerimba Archipelago, off the east coast of Africa, Heron-Allen and Earland note the abundance of *A. melo* and the scarcity in comparison of *A. boscii*. In the Philippine material *A. boscii* is, at the shallow-water stations, especially on the eastern side of the Sulu Sea, very abundant, while I have made no records of *A. melo* in all the material examined. With the data given by Millett it would seem that in its distribution from the Hawaiian Islands to the Red Sea, it does not extend far northward in the Malayan and Philippine regions.

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[48] Trans. Zool. Soc. London, vol. 20, 1915, p. 606.

Worthy of special remark is the finding of beautiful microspheric specimens of *A. boscii*, confirming in all details Chapman's observations on the two forms from the Great Barrier Reef of Australia. The two forms are here figured.

The species was not found outside the region of the eastern border of the Sulu Sea except at D5192, in 32 fathoms (59 meters), off northern Cebu, and D5218, in 20 fathoms (37 meters), between Burias and Luzon. This may be due in part to the fact that shallow-water collecting was most extensively carried out in this region. In the Sulu Sea, off western Mindanao, Busilan, Siasi, Jolo, and Tawi Tawi, it occurred in great abundance in material dredged from 10 to 38 fathoms (18 to 70 meters). At one station, D5153, in 49 fathoms (90 meters), off Tawi Tawi, the specimens were smaller; and at D5172 a specimen was obtained in 318 fathoms (582 meters)—an especially deep record for this species.

It was not found in the region to the south, largely for the reason that the material from that region is from much deeper water.

*Alveolina boscii—Material examined.*

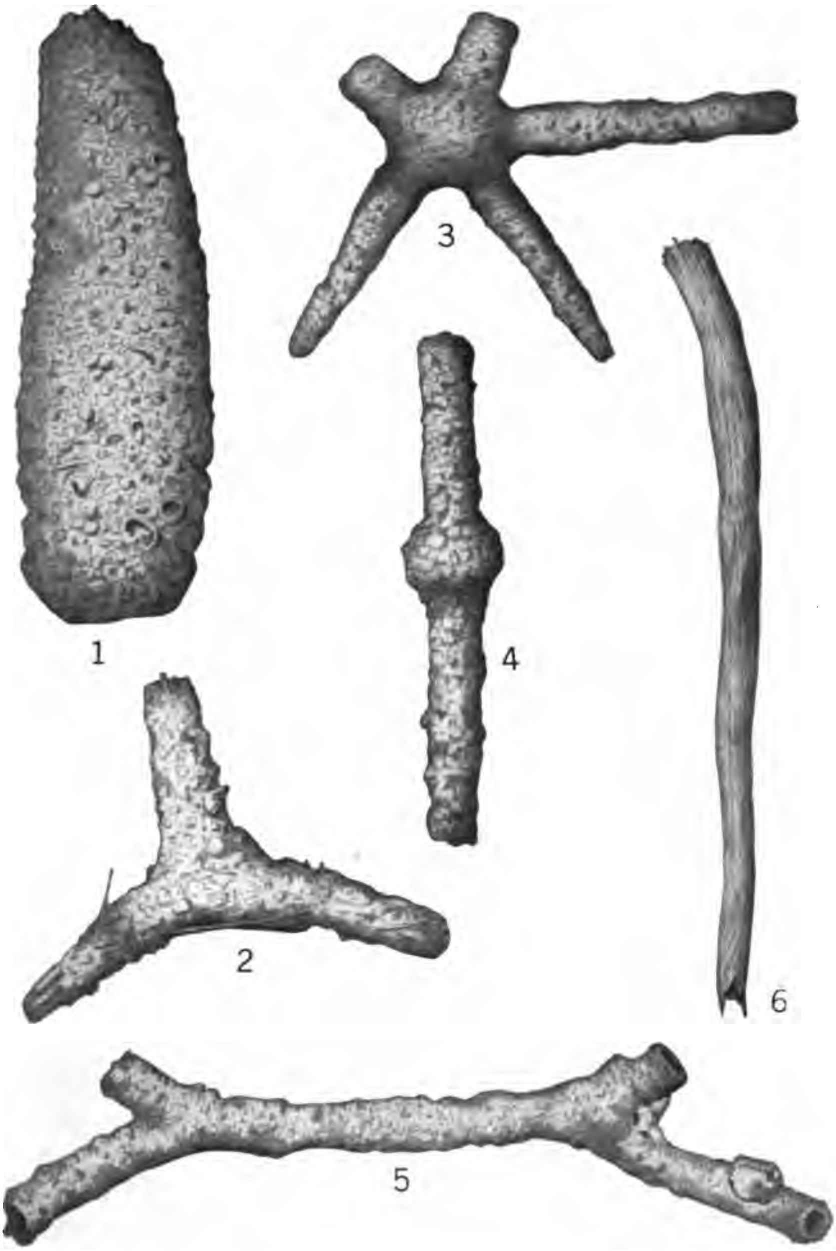
| Cat. No. | Coll. of— | No. of specimens. | Station. | Locality. | Depth in fathoms. | Bottom temperature. | Character of bottom. | Abundance. |
|---|---|---|---|---|---|---|---|---|
| | | | | | | ° F. | | |
| 10788 | U.S.N.M. | 10+ | D5133... | Island off Panabutan Pt., N. 52° E., 1.50 miles. | 38 | ....... | gn. m., s..... | Abundant. |
| | | | | ° ′ ″ ° ′ ″ | | | | |
| 10789 | U.S.N.M. | 3 | D5134... | 6 44 45 N.; 121 48 00 E... | 25 | ....... | fne. s........ | Few. |
| 10790 | U.S.N.M. | 10+ | D5148... | 5 35 40 N.; 120 47 30 E... | 17 | ....... | co. s......... | Common. |
| 10791 | U.S.N.M. | 1 | D5153... | 5 18 10 N.; 120 02 55 E... | 49 | ....... | co. s., sh..... | Rare. |
| 10792 | U.S.N.M. | 10+ | D5154... | 5 14 50 N.; 119 58 45 E... | 12 | ....... | co. s......... | Common. |
| 10793 | U.S.N.M. | 1 | D5158... | 5 12 00 N.; 119 54 30 E... | 12 | ....... | crs. s., sh.... | Few. |
| 10794 | U.S.N.M. | 10+ | D5159... | 5 11 50 N.; 119 54 00 E... | 10 | ....... | co. s......... | Abundant. |
| 10795 | U.S.N.M. | 10+ | D5160... | 5 12 40 N.; 119 55 10 E... | 12 | ....... | s............ | Abundant. |
| 10796 | U.S.N.M. | 1 | D5161... | 5 10 15 N.; 119 53 00 E... | 16 | ....... | fne. s........ | Few. |
| 10797 | U.S.N.M. | 1 | D5172... | 6 03 15 N.; 120 35 30 E... | 318 | ....... | fne. s., sh.... | Rare. |
| 10798 | U.S.N.M. | 1 | D5179... | 12 38 15 N.; 122 12 30 E... | 37 | 75.7 | hrd. s........ | Rare. |
| 10800 | U.S.N.M. | 10+ | D5192... | 11 09 15 N.; 123 50 00 E... | 32 | ....... | gn. s......... | Common. |
| 10799 | U.S.N.M. | 10+ | D5218... | 13 11 15 N.; 123 02 45 E... | 20 | ....... | crs. s........ | Common |

# EXPLANATION OF PLATES.

## EXPLANATION OF PLATES.

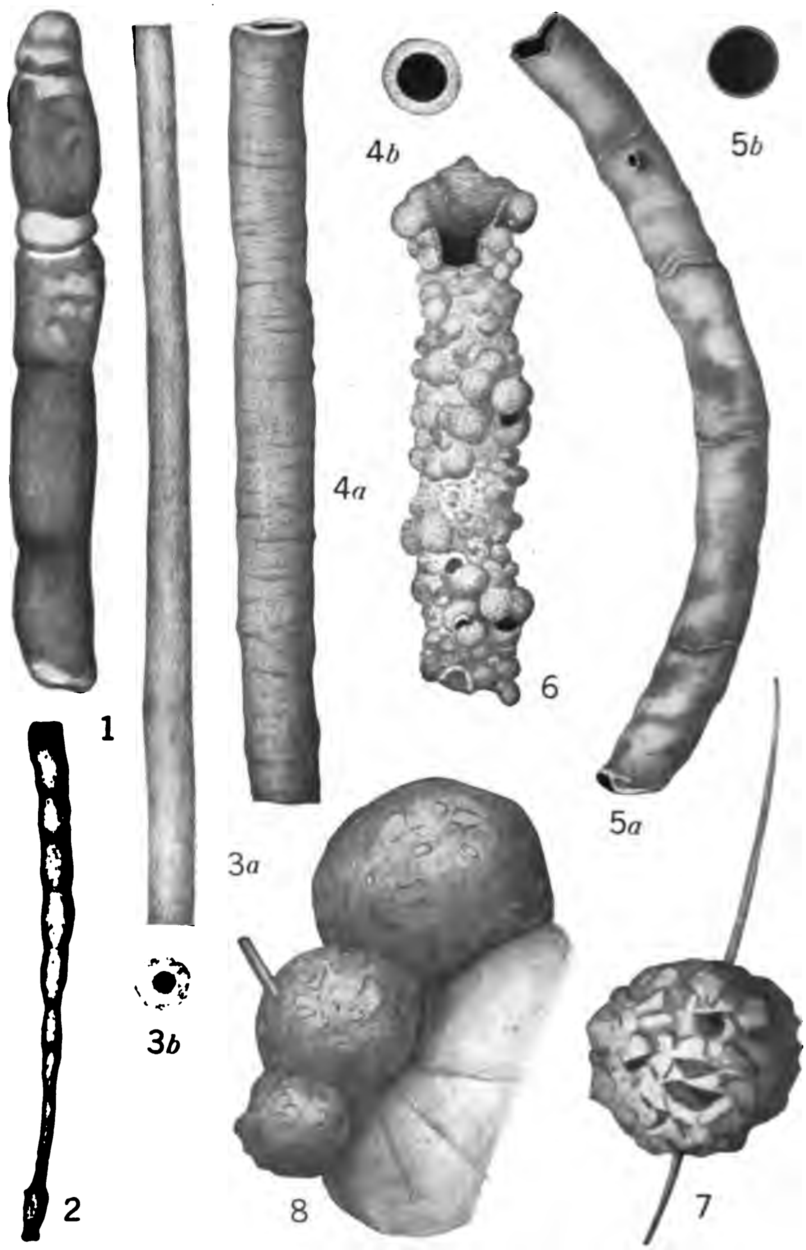
### PLATE 1.

FIG. 1. *Astrorhiza granulosa.* × 13.
2. *Rhabdammina abyssorum.* ×13.
3. *Rhabdammina abyssorum,* var. *radiata.* × 7.
4. *Rhabdammina linearis.* × 13.
5. *Rhabdammina irregularis.* × 7.
6. *Marsipella gigantea.* × 7.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 490.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

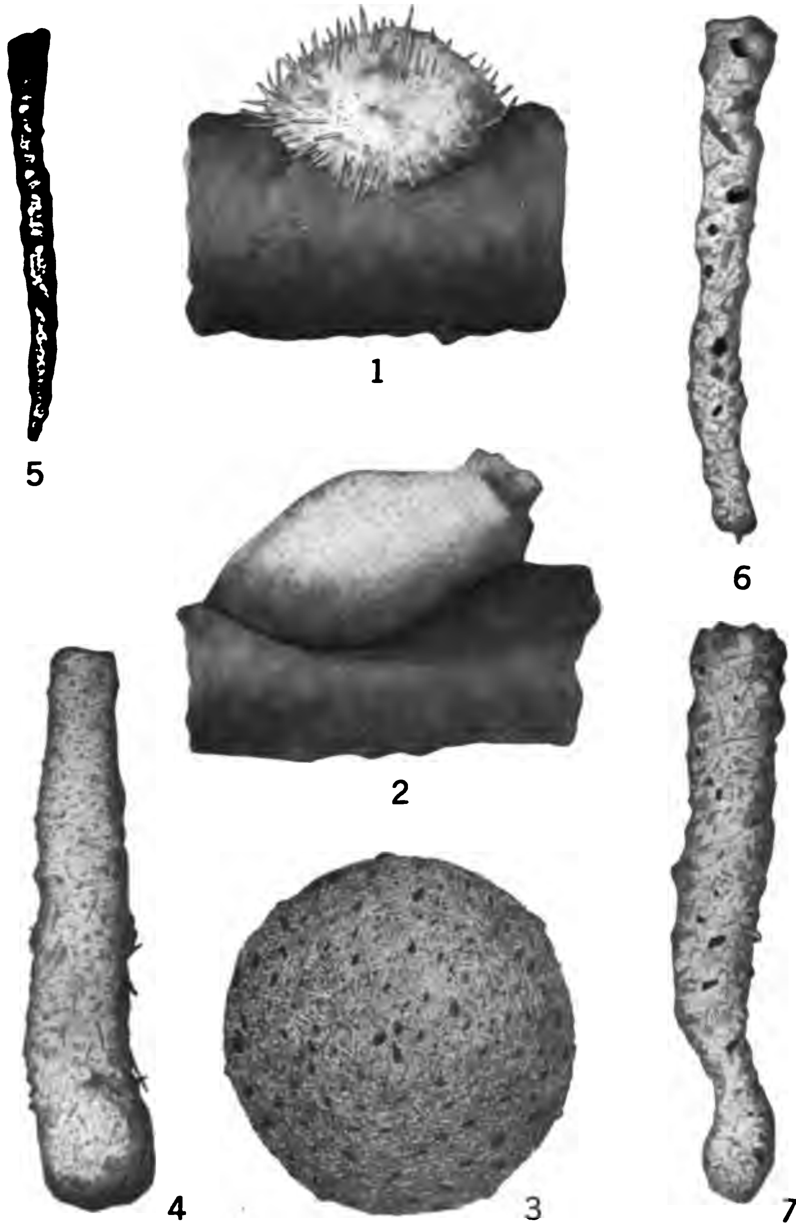
FOR EXPLANATION OF PLATE SEE PAGE 491.

## PLATE 2.

Fig. 1. *Bathysiphon filiformis.* × 7.
2. *Bathysiphon rufus.* × 7.
3. *Bathysiphon rufescens.* × 12. *a*, side view; *b*, end view.
4. *Bathysiphon flavidus*, var. *giganteus.* × 3. *a*, side view; *b*, end view.
5. *Bathysiphon papyraceus.* × 3. *a*, side view; *b*, end view.
6. *Rhizammina indivisa.* × 27.
7. *Psammosphaera parva.* × 66.
8. *Saccammina sphaerica*, var. *catenulata.* × 30.

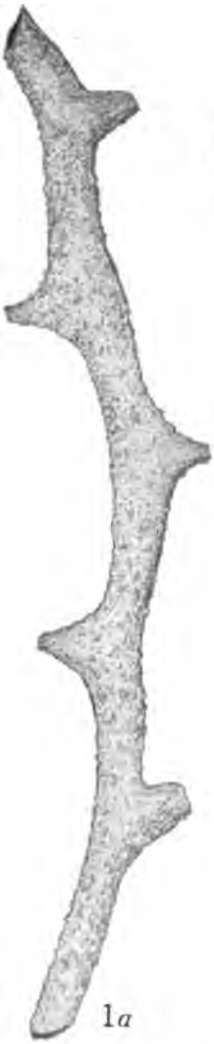
## PLATE 3.

FIG. 1. *Tholosina bulla*—hispid form. × 33.
2. *Tholosina bulla*—smooth form. × 33.
3. *Thurammina papyracea*. × 33.
4. *Hyperammina friabilis*. × 7.
5. *Hyperammina elongata*. × 13.
6. *Jaculella obtusa*. × 13.
7. *Jaculella acuta*. × 13.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 492.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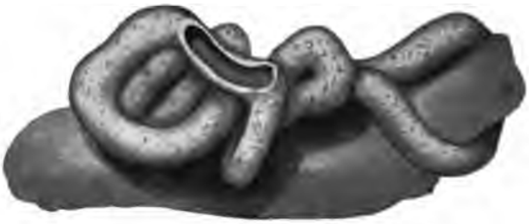
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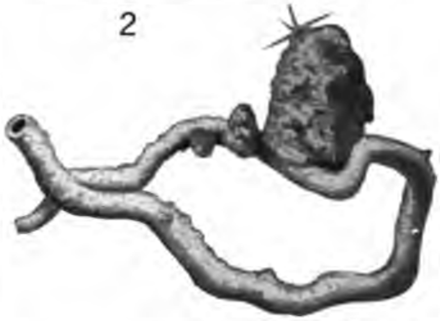
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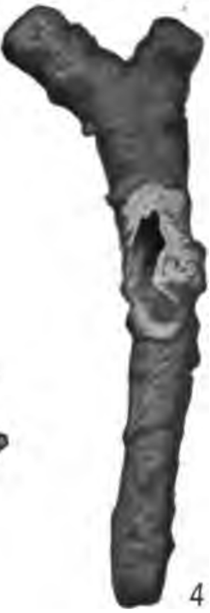
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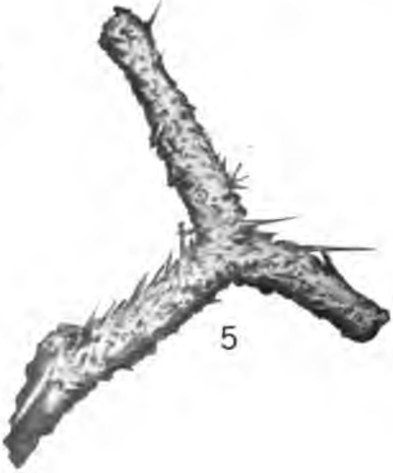
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1b

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 493.

## PLATE 4.

Fig. 1. *Dendrophrya attenuata.* × 8. *a*, side view; *b*, end view.
2. *Tolypammina vagans.* × 25.
3. *Tolypammina vagans.* × 30.
4. *Tholosina bulla* attached to *Rhabdammina irregularis.* × 10.
5. *Saccorhiza ramosa.* × 30.

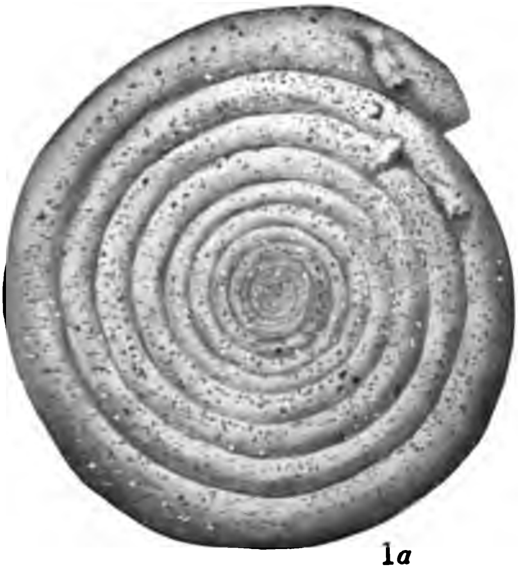
## Plate 5.

FIG. 1. *Ammodiscus incertus*. × 10, microspheric form. *a*, side view; *b*, apertural view.

2. *Ammodiscus incertus*. × 10. Megalospheric form.

3. *Ammodiscus incertus*, var. *discoideus*. × 10. *a*, side view, *b*, apertural view. Microspheric form.

4. *Ammodiscus exsertus*. × 13.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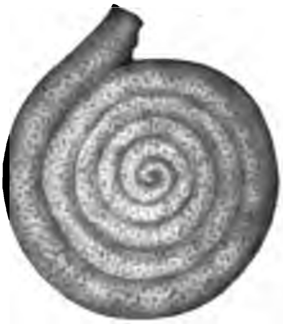
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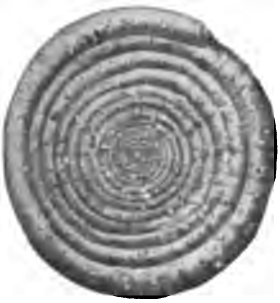
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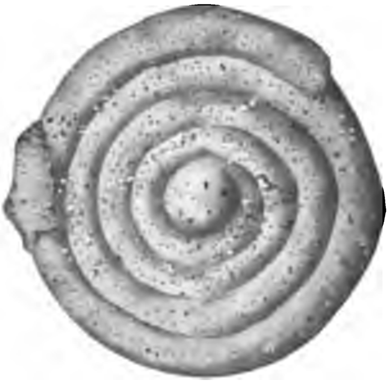
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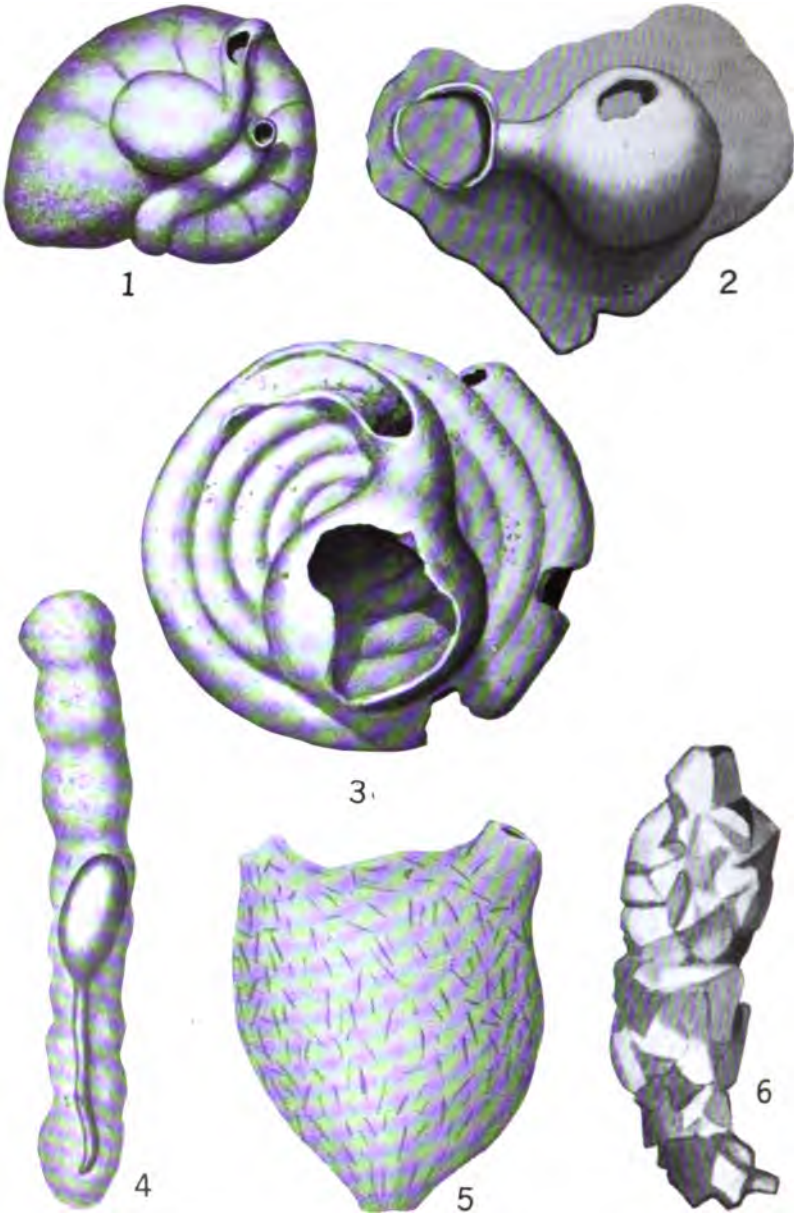
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 494.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 495.

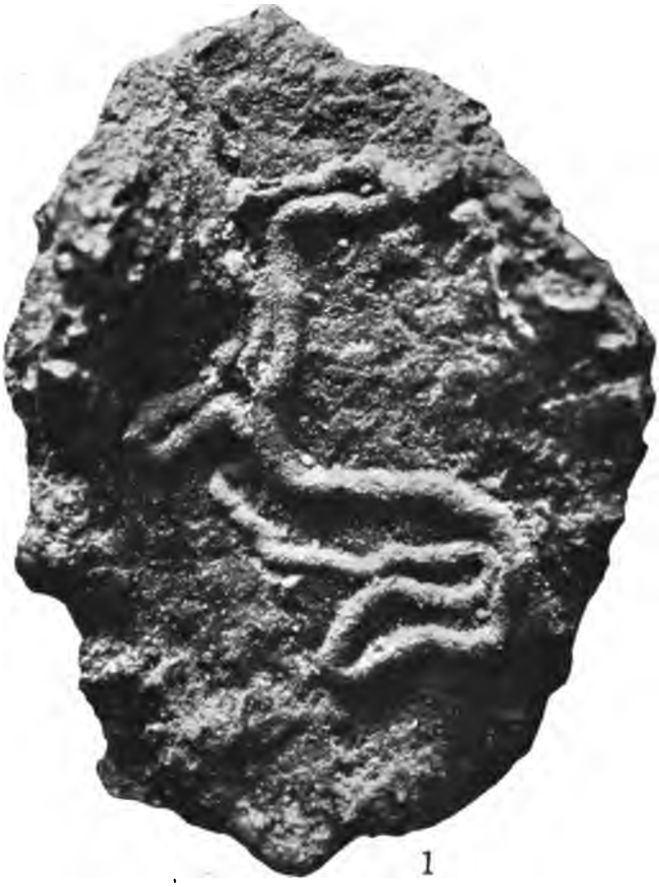
## PLATE 6.

FIG. 1. *Ammolagena clavata*, microspheric form attached to *Cyclammina*. × 7.

2. *Ammolagena clavata*, megalospheric form with secondary chamber. × 7.
3. *Ammolagena clavata*, megalospheric form attached to *Ammodiscus*. × 25.
4. *Ammolagena clavata*, microspheric form attached to *Clavulina*. × 30.
5. *Aschemonella catenata*. × 25.
6. *Reophax scorpiurus*. × 30.

## PLATE 7.

FIG. 1. *Tolypammina vagans.* × 15.
2. *Tolypammina vagans.* × 15.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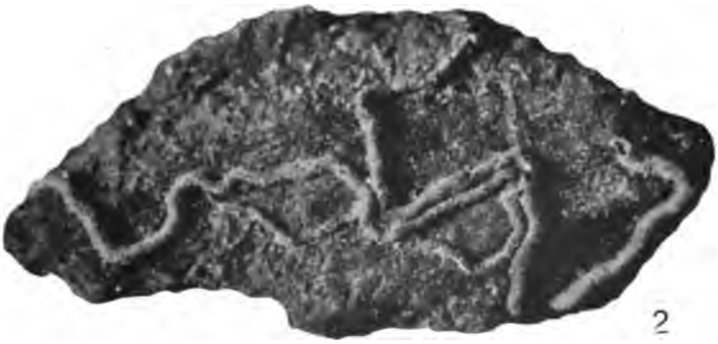
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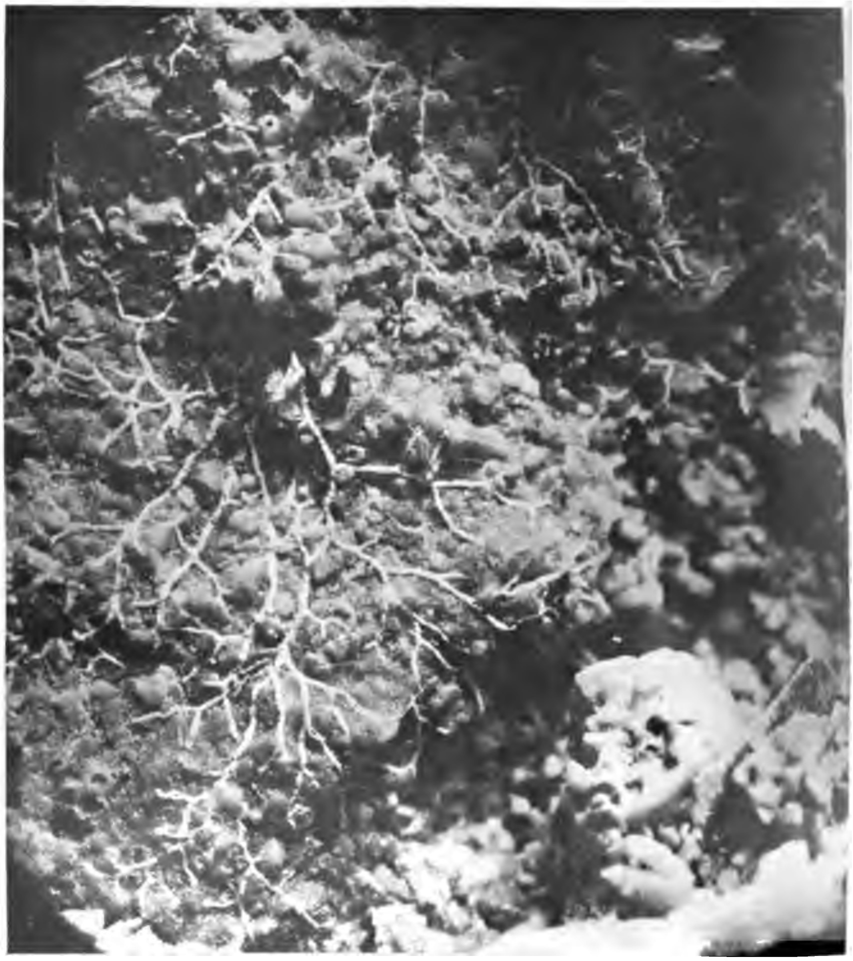
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 496



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

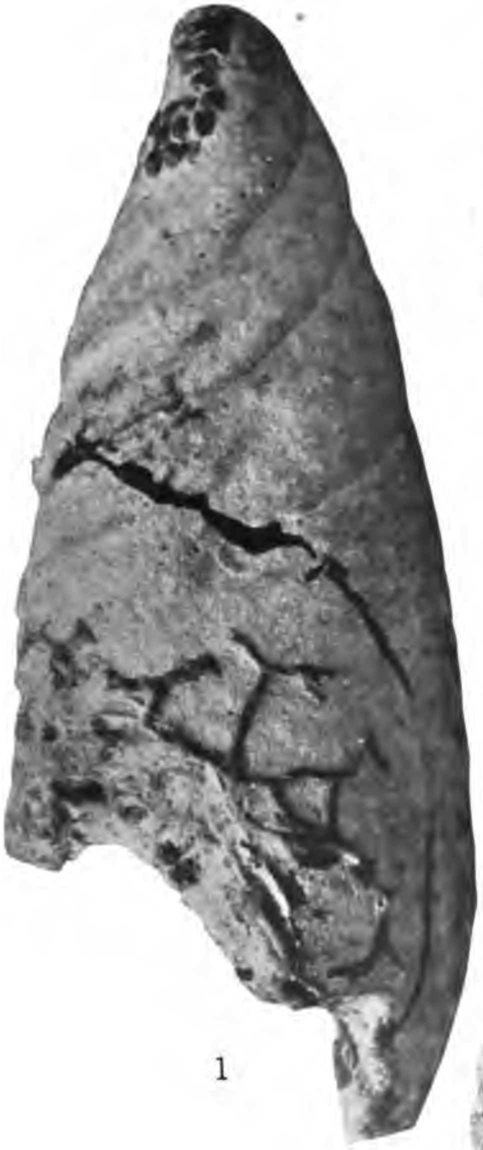
FOR EXPLANATION OF PLATE SEE PAGE 497.

PLATE 8.

FIG. 1. *Sagenina divaricans.* × 15.

PLATE 9.

FIG. 1. *Sagenina frondescens*, attached to shell. × 15.
2, 3. *Hormosina ovaliformis*. × 15.
4–6. *Ammosphaeroidina grandis*. × 7.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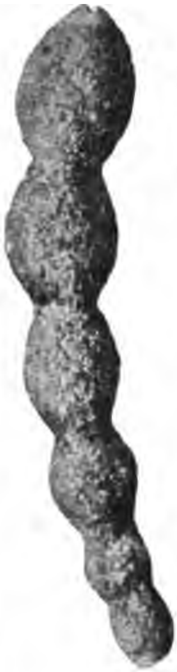
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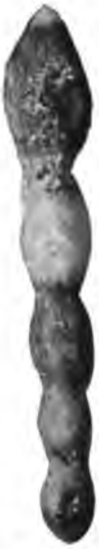
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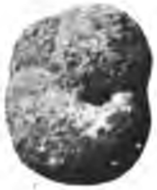
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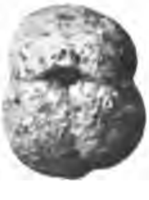
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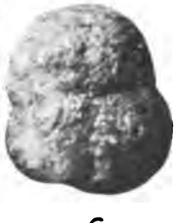
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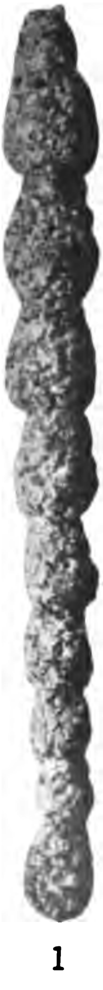
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 498.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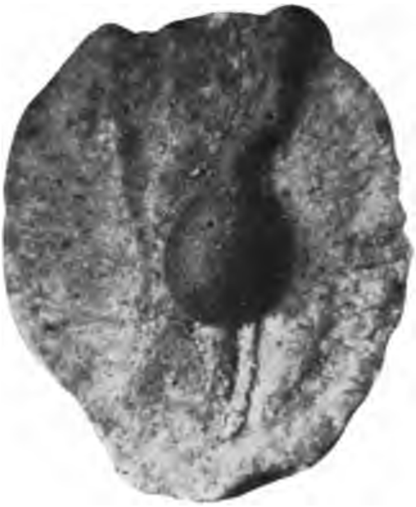
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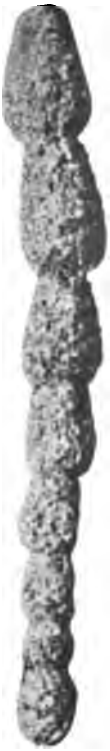
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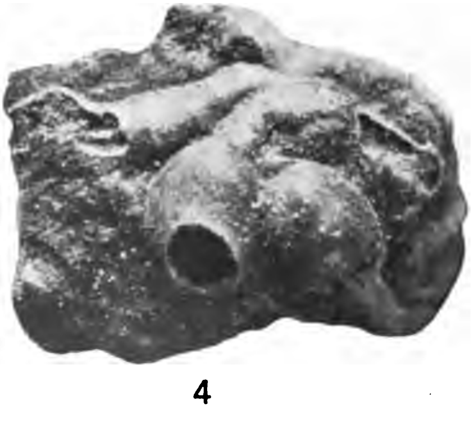
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FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

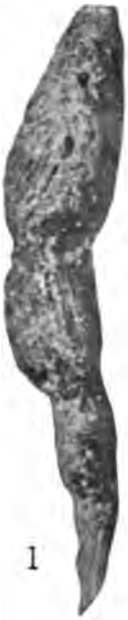
FOR EXPLANATION OF PLATE SEE PAGE 499.

## PLATE 10.

FIGS. 1, 2. *Reophax nodulosus.* × 15.
3, 4. *Ammolagena clavata.* × 15.

## PLATE 11.

FIG. 1. *Reophax spiculotestus.* × 20.
2. *Haplophragmoides grandiformis.* × 30.
3. *Ammobaculites reophaciformis.* × 30.
4. *Trochammina globigeriniformis.* × 15, ventral view.
5. *Trochammina globigeriniformis.* × 15, dorsal view.
6. *Sphaerammina ovalis.* × 15, side view.
7. *Sphaerammina ovalis.* × 15, apertural view.
8. *Sphaerammina ovalis.* × 15, side view.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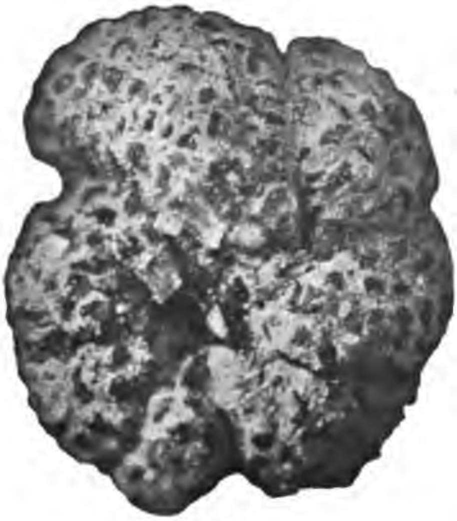
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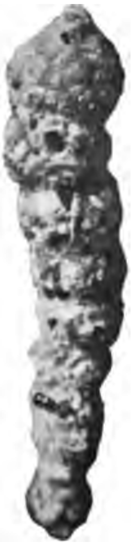
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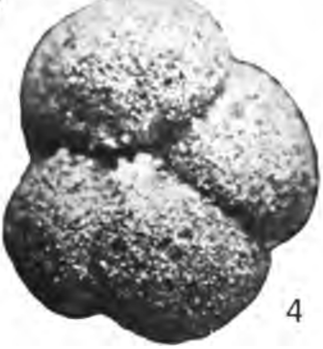
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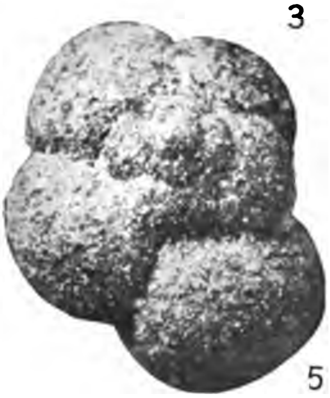
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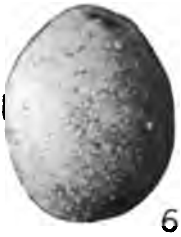
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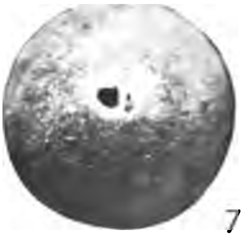
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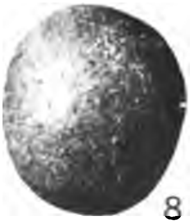
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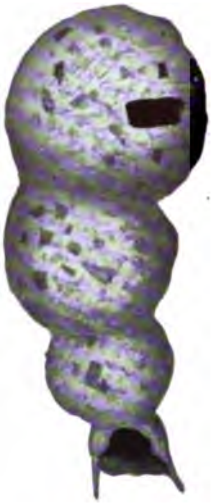
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 500.



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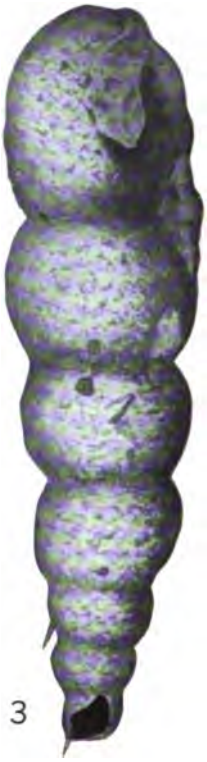

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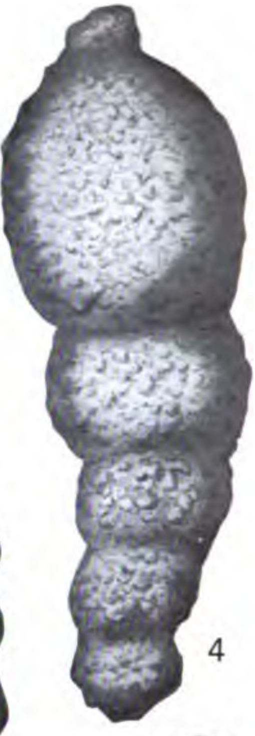

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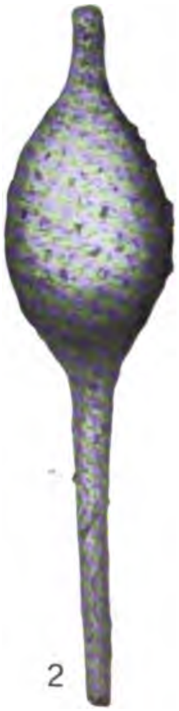

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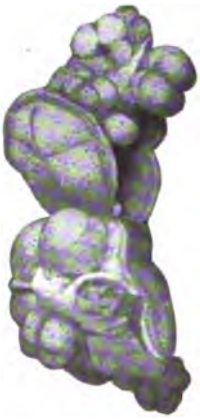

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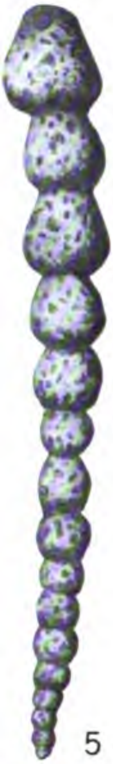

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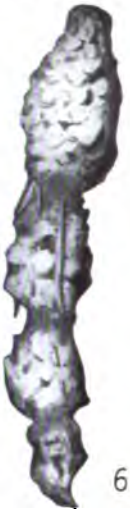

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FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

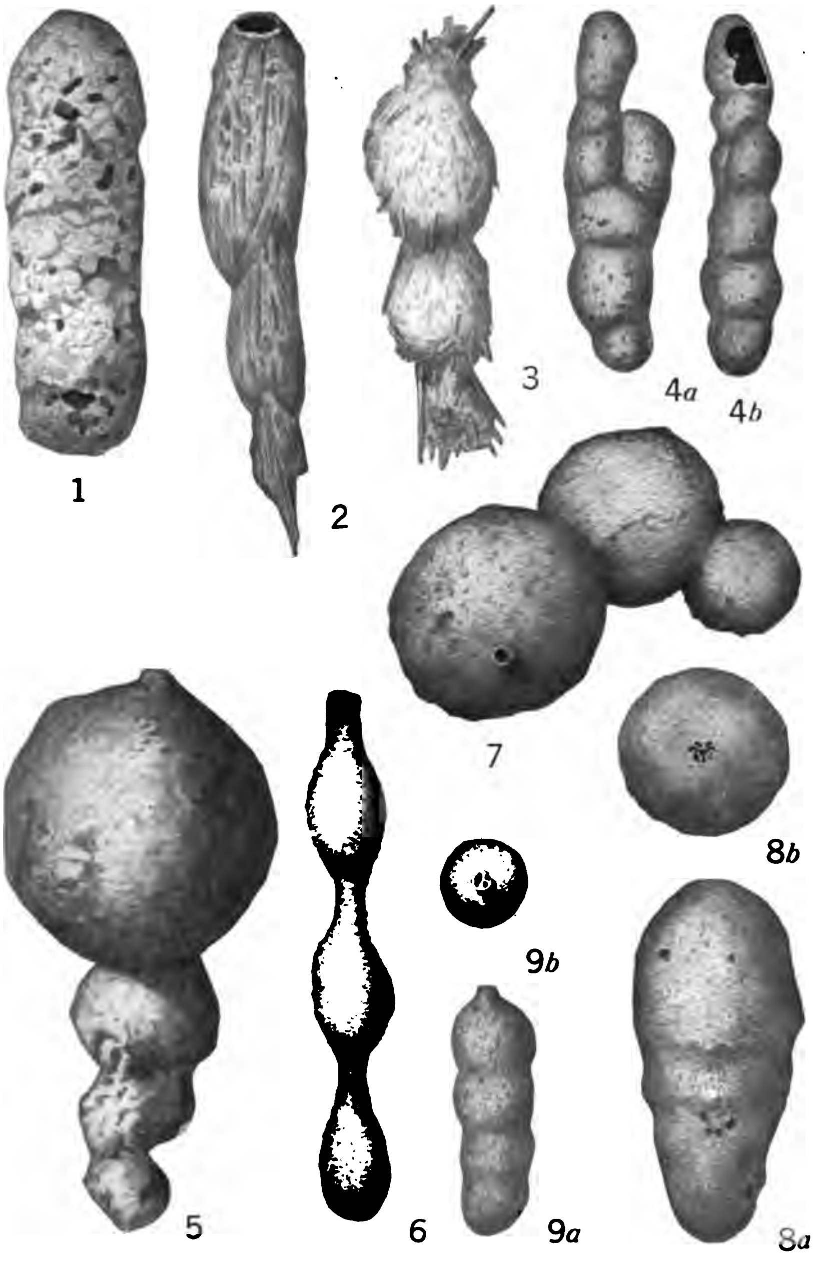
FOR EXPLANATION OF PLATE SEE PAGE 501.

## PLATE 12.

FIG. 1. *Reophax pilulifer.* × 60.
2. *Reophax distans.* × 30.
3. *Reophax bacillaris.* × 30.
4. *Reophax dentaliniformis.* × 30.
5. *Reophax nodulosus.* × 15.
6. *Reophax guttifer.* × 30.
7. *Reophax bilocularis.* × 30.

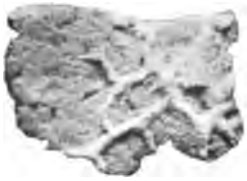
## PLATE 13.

FIG. 1. *Reophax cylindricus.* × 15.
2. *Reophax spiculotestus.* × 25.
3. *Reophax horridus.* × 30.
4. *Reophax findens.* × 30. *a*, front view; *b*, side view.
5. *Hormosina globulifera.* × 25.
6. *Hormosina ovicula.* × 15.
7. *Hormosina normani.* × 30.
8. *Haplostiche dubia.* × 7. Megalospheric form, *a*, side view: *b*, apertural view.
9. *Haplostiche dubia.* × 7. Microspheric form, *a*, side view; *b*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 602.



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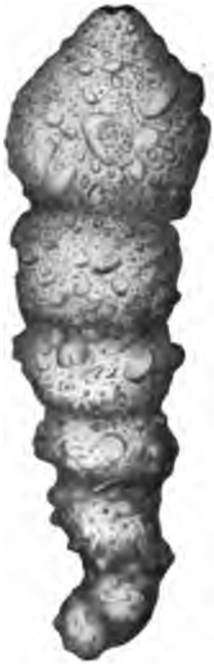

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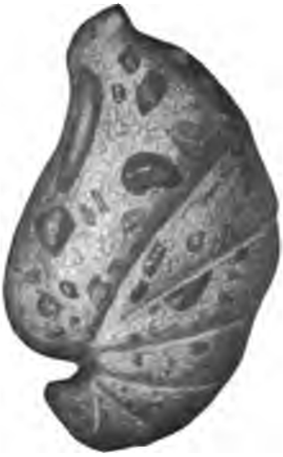

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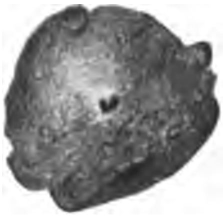

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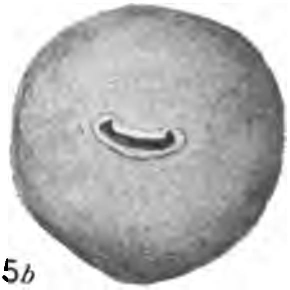

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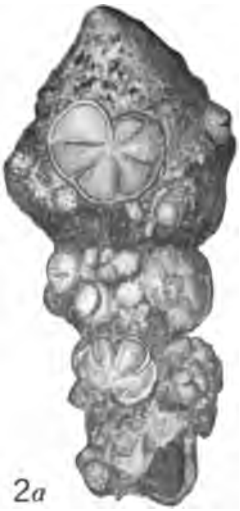

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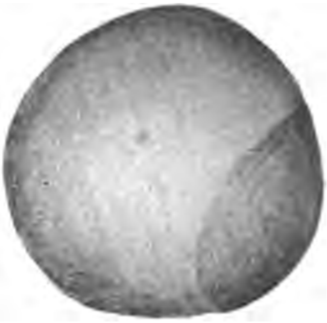


5

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 503.

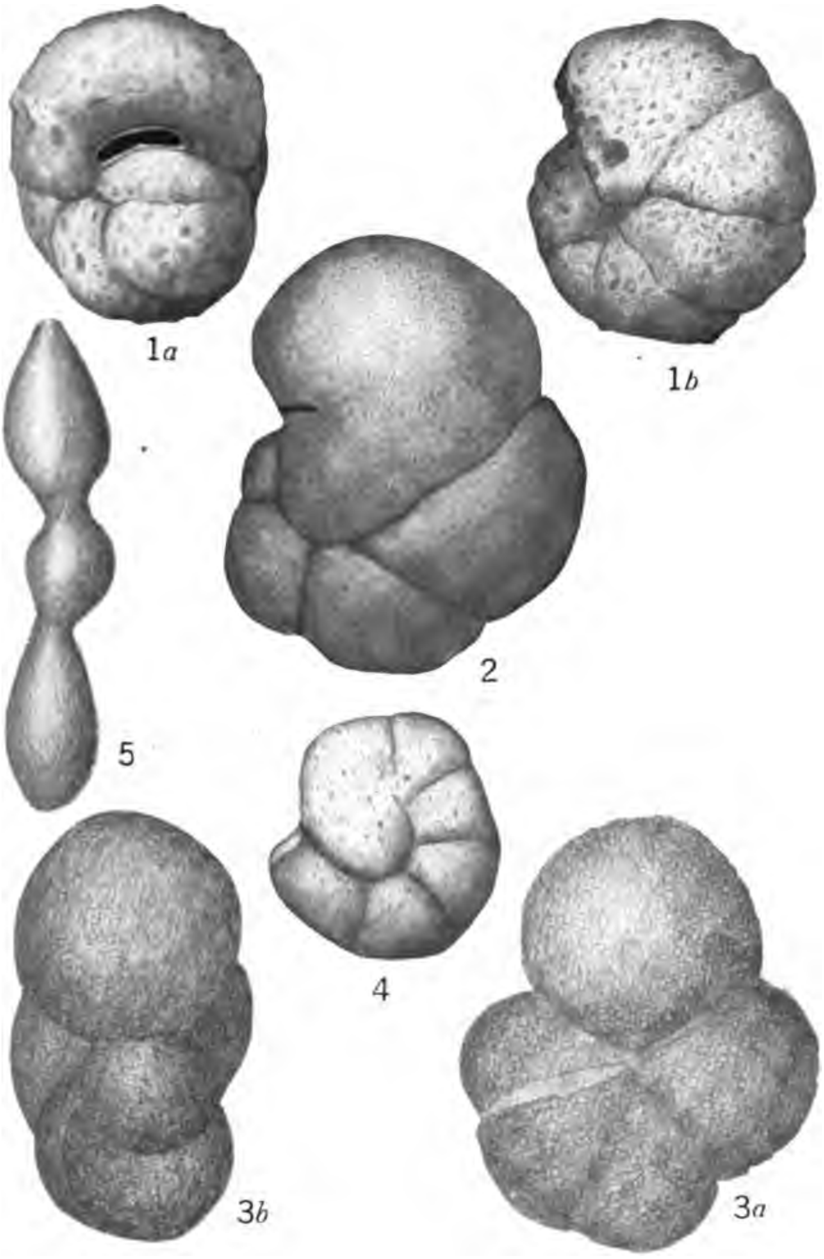
## PLATE 14.

FIG. 1. *Sagenina frondescens.* × 15.

2. *Reophax agglutinatus.* × 15. *a*, front view; *b*, apertural view.
3. *Ammobaculites reophaciformis.* × 40.
4. *Ammobaculites cassis.* × 25.
5. *Sphaerammina ovalis.* × 50. *a*, front view; *b*, apertural view.

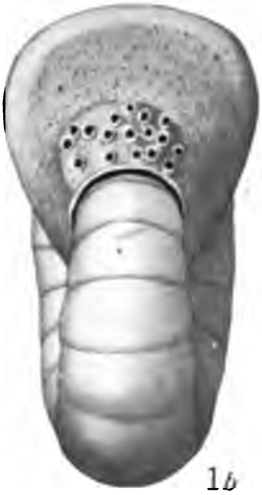
## PLATE 15.

FIG. 1. *Haplophragmoides subglobosum.* × 25. *a*, apertural view; *b*, side view.
2. *Haplophragmoides ringens.* × 60.
3. *Haplophragmoides sphaeriloculum.* × 30. *a*, side view; *b*, apertural view.
4. *Trochammina turbinata.* × 20.
5. *Hormosina carpenteri.* × 15.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 504.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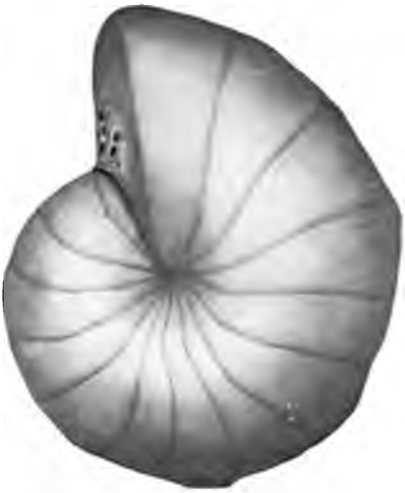
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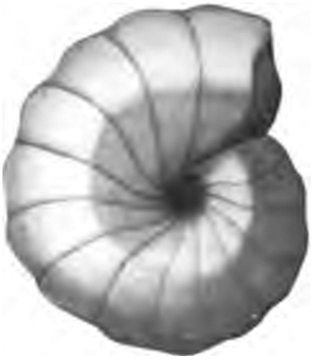
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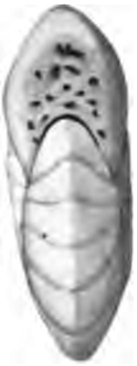
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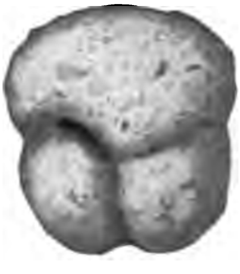
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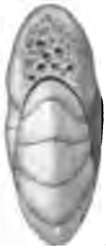
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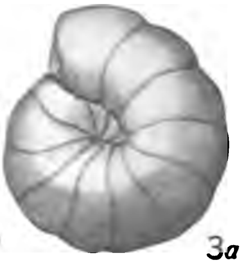
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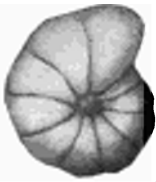
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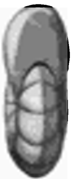

4*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

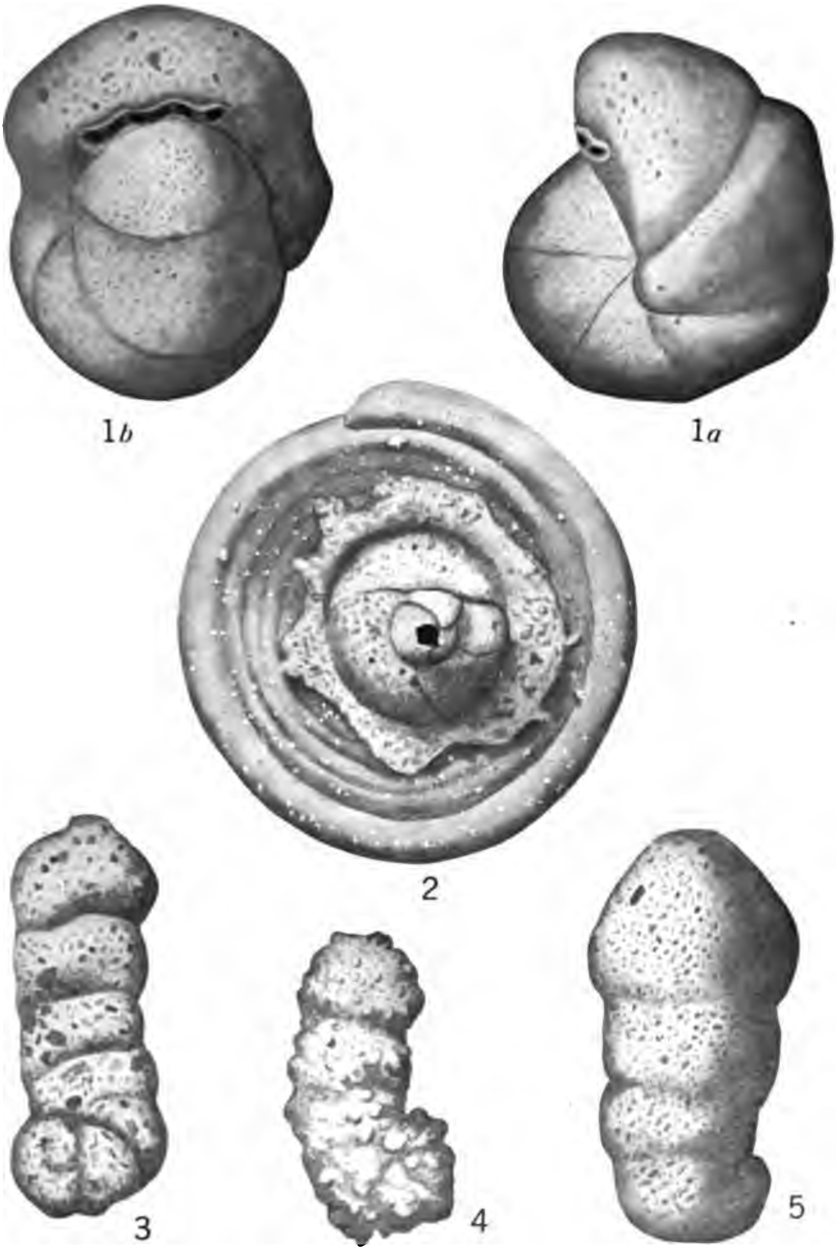
FOR EXPLANATION OF PLATE SEE PAGE 506.

## PLATE 16.

FIG. 1. *Cyclammina cancellata.* × 18. *a*, side view; *b*, apertural view.
2. *Cyclammina compressa.* × 18. *a*, side view; *b*, apertural view.
3. *Cyclammina pauciloculata.* × 18. *a* side view; *b*, apertural view.
4. *Cyclammina pusilla.* × 18. *a*, side view; *b*, apertural view.
5. *Ammosphaeroidina grandis.* × 15.

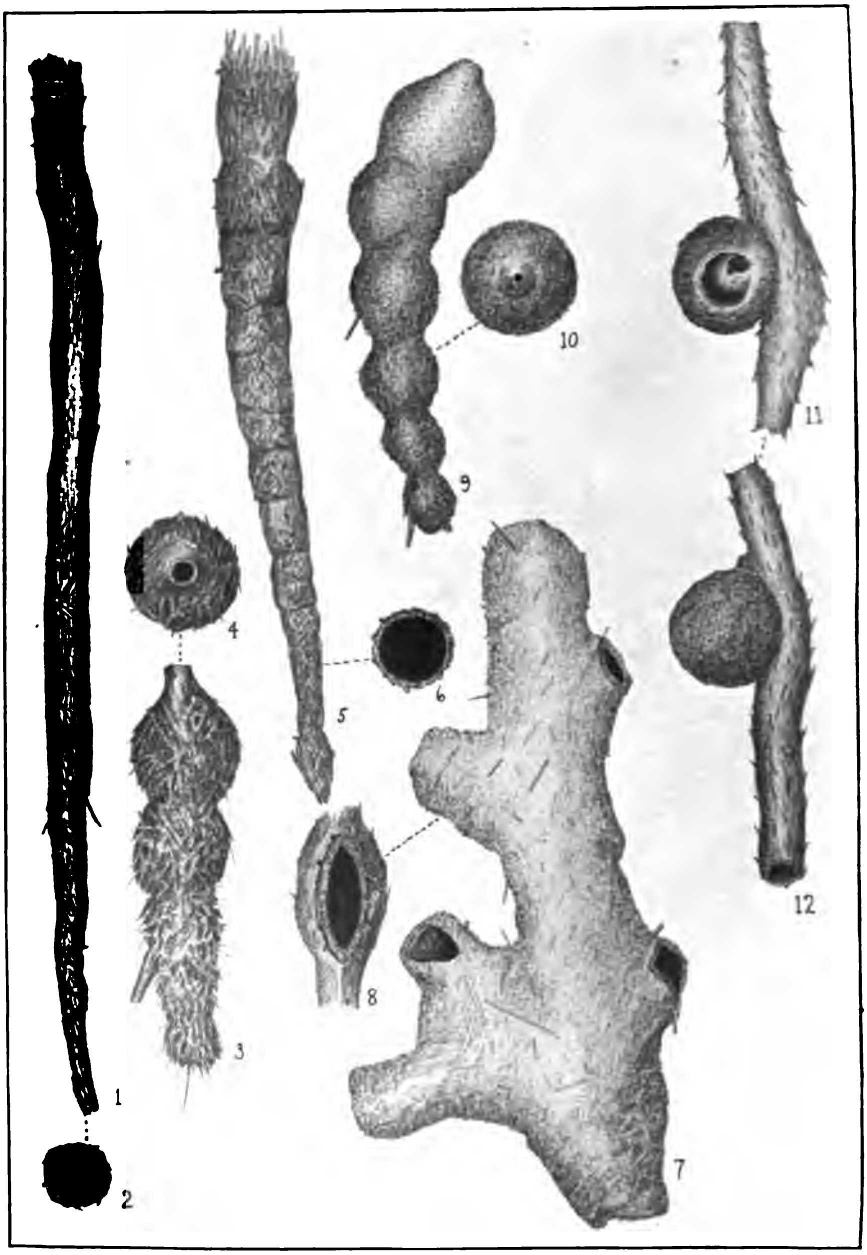
## PLATE 17.

FIG. 1. *Cribrostomoides bradyi*. × 25. *a*, side view; *b*, apertural view.
2. *Trochammina squamata*, attached to *Ammodiscus*. × 30.
3. *Ammobaculites calcareum*. × 18.
4. *Ammobaculites agglutinans*. × 25.
5. *Ammobaculites cylindricus*. × 25.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 506.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

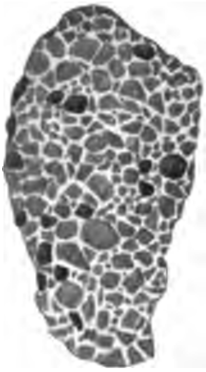
FOR EXPLANATION OF PLATE SEE PAGE 507.

## PLATE 18.

FIG. 1. *Marsipella gigantea.* × 15. Front view.
2. *Marsipella gigantea.* × 15. Apertural view.
3. *Reophax horridus.* × 30. Front view.
4. *Reophax horridus.* × 30. Apertural view.
5. *Haliphysema catenulata.* × 15. Front view.
6. *Haliphysema catenulata.* × 15. Apertural view.
7. *Dendrophrya ramosa.* × 15. Front view.
8. *Dendrophrya ramosa.* × 15. Apertural view.
9. *Hormosina ovaliformis.* × 15. Front view.
10. *Hormosina ovaliformis.* × 15. Apertural view.
11. *Ammosphaerulina adhaerens.* × 30. Interior view.
12. *Ammosphaerulina adhaerens.* × 30. Exterior view.

## PLATE 19.

FIG. 1. *Ammobaculites pseudospirale.* × 18. H4898.
2. *Ammobaculites pseudospirale.* × 18. H4898.
3. *Reophax aduncus.* × 21. D5478.
4. *Clavulina parisiensis.* × 21. D5201.
5. *Bolivina limbata.* × 30. D5178.
6. *Textularia hauerii.* × 24. D5276.
7. *Textularia foliacea.* × 30. D5145. *a*, front view; *b*, side view.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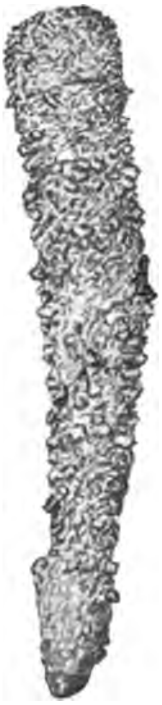
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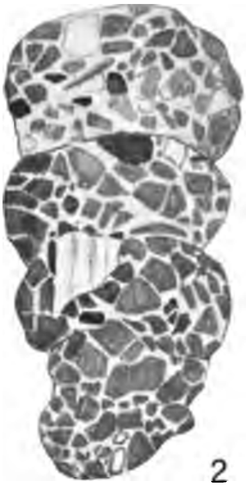
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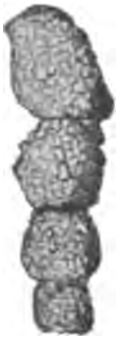
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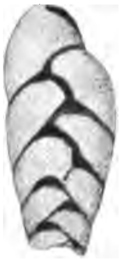
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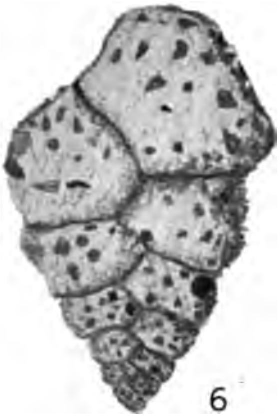
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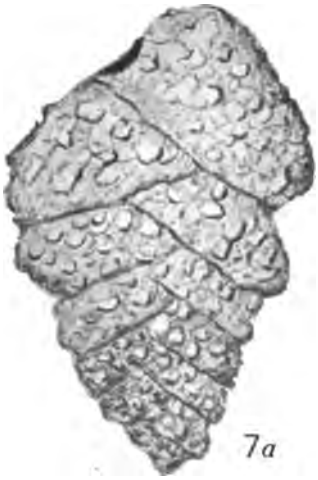
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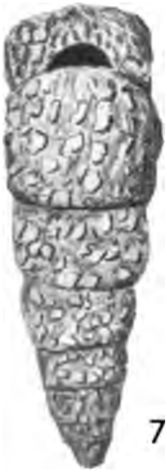
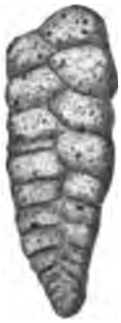

7*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 508.



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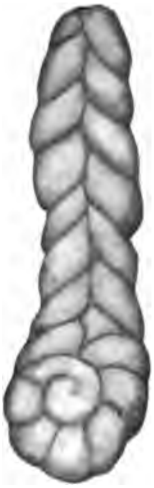

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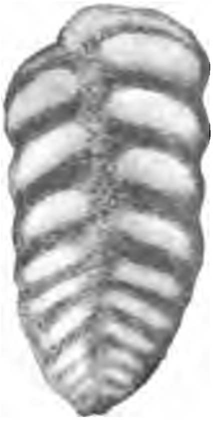

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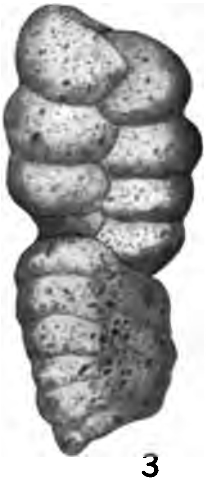

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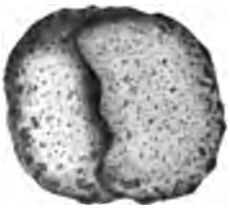

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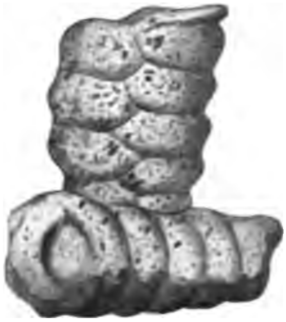

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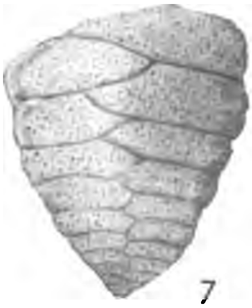

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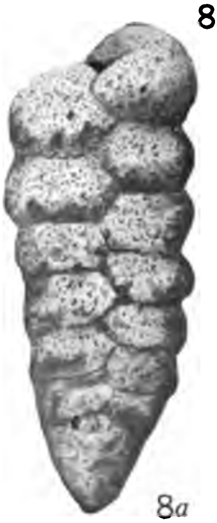
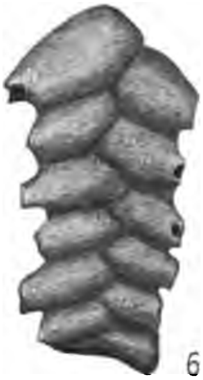


8*a*



6

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

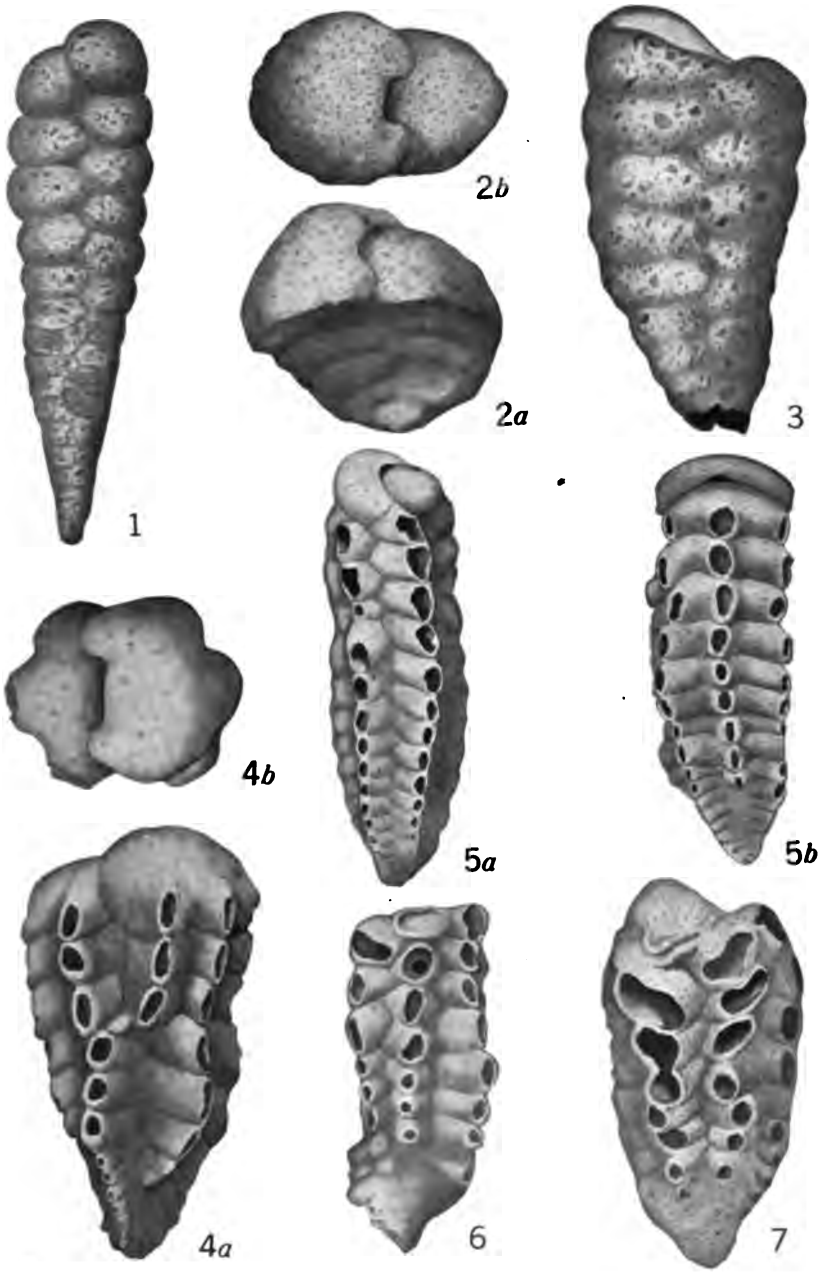
FOR EXPLANATION OF PLATE SEE PAGE 509.

## PLATE 20.

FIG. 1. *Spiroplecta bulbosa.* × 85.
2. *Textularia sagittula.* × 15.
3, 4. *Textularia sagittula.* Abnormal specimens. × 30.
5. *Textularia sagittula.* var. *atrata.* × 35.
6. *Textularia sagittula,* var. *fistulosa.* × 35.
7. *Textularia gramen.* × 35.
8. *Textularia agglutinans.* × 30. *a*, front view; *b*, apertural view.

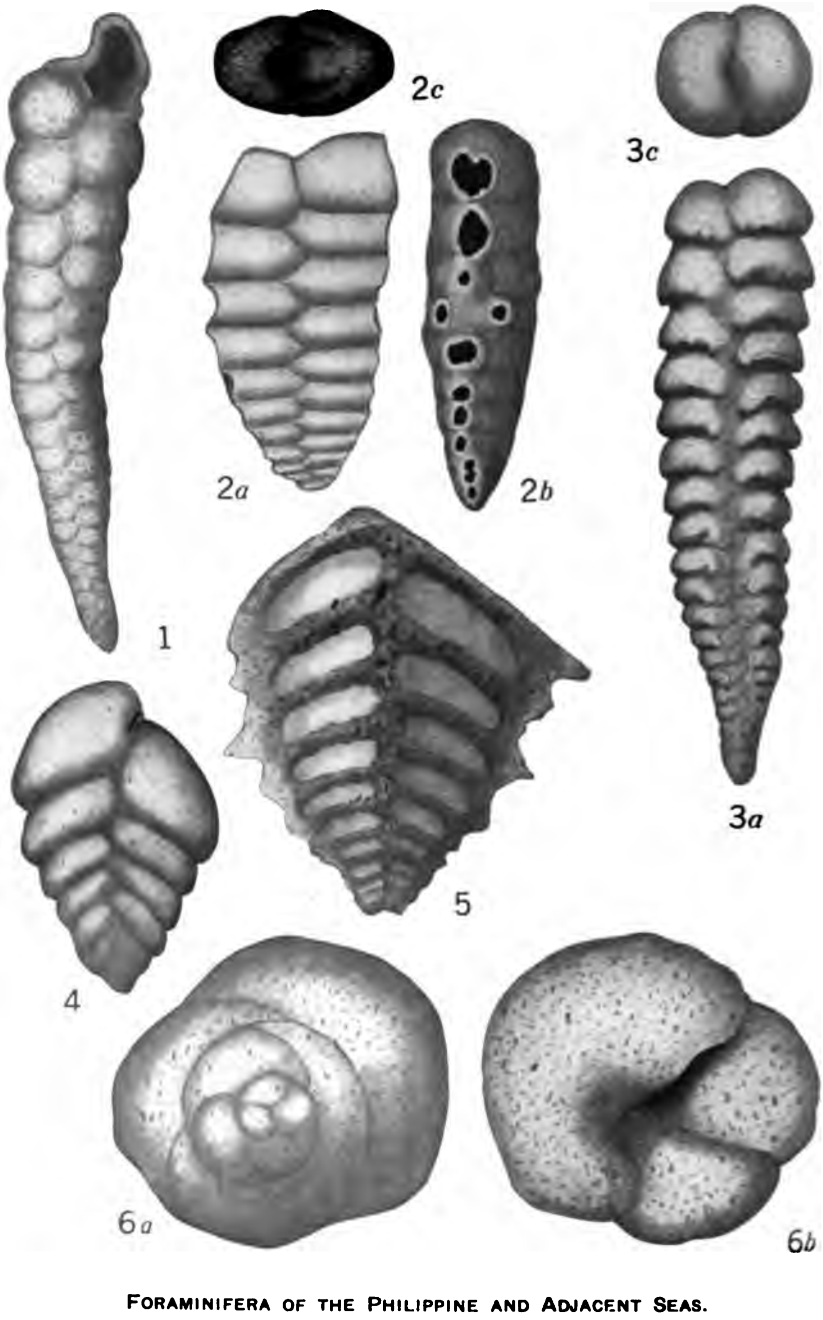
## PLATE 21.

FIG. 1. *Textularia stricta.* × 15.
2. *Textularia abbreviata.* × 35. *a*, front view; *b*, apertural view.
3. *Textularia goësii.* × 35.
4. *Textularia siphonifera.* × 75. *a*, front view; *b*, apertural view; specimen with bifurcating rows of pores.
5. *Textularia siphonifera.* × 35. *a*, front view; *b*, side view.
6. *Textularia siphonifera.* × 35, microspheric specimen with twisted early portion.
7. *Textularia siphonifera.* × 35, specimen with very large openings, two fused.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 510.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 511.

## PLATE 22.

FIG. 1. *Textularia porrecta.* × 35.

2. *Textularia transversaria.* × 75. *a*, front view; *b*, side view; *c*, apertural view.

3. *Textularia vertebralis.* × 18. *a*, front view; *c*, apertural view.

4. *Textularia flintii.* × 35.

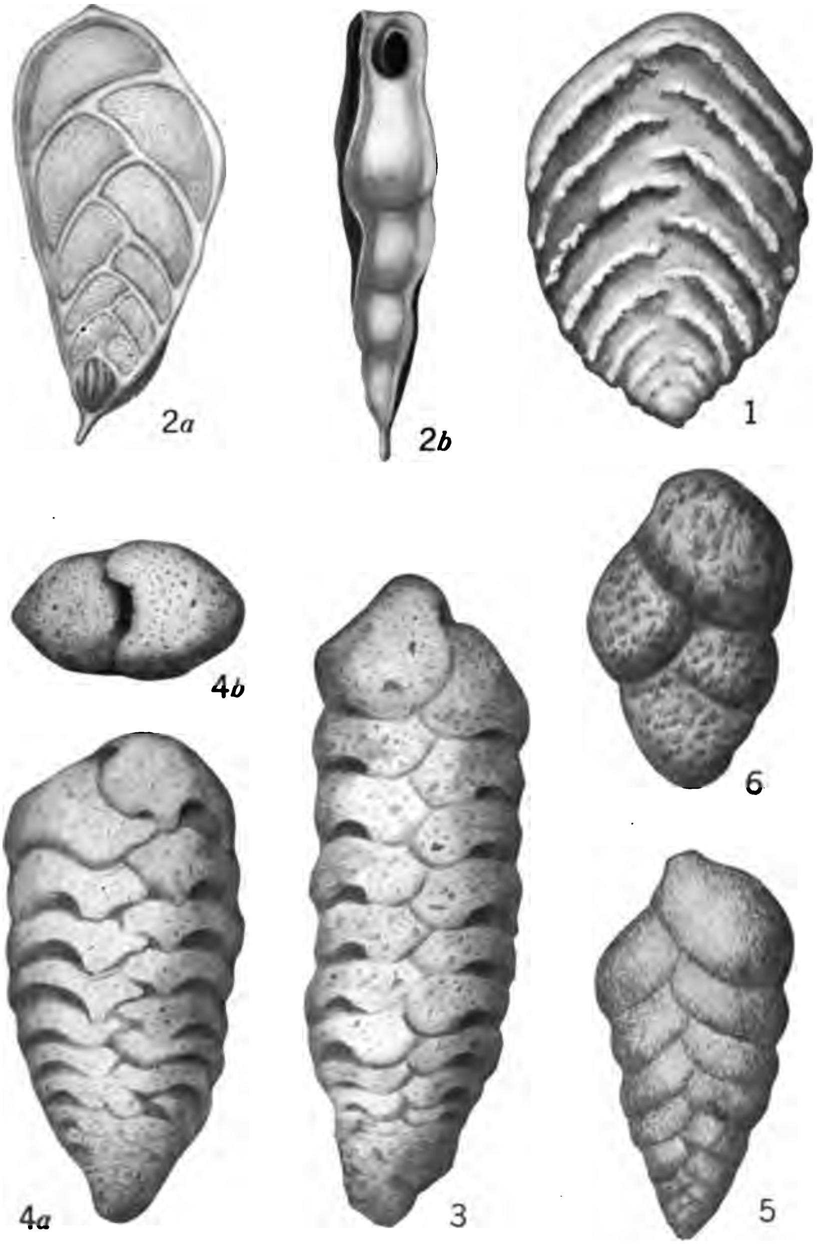
5. *Textularia pseudocarinata.* × 75.

6. *Trochammina squamata.* × 75. *a*, dorsal view; *b*, ventral view.

## PLATE 23.

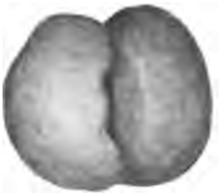
FIG. 1. *Textularia crassisepta.* × 75.

2. *Textularia quadrilatera.* × 75. *a*, front view; *b*, side view.
3. *Textularia rugosa.* × 35.
4. *Textularia rugosa.* × 35. *a*, front view; *b*, apertural view.
5. *Textularia catenata.* × 75. D5551.
6. *Textularia aspera.* × 35. D5121.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 512.



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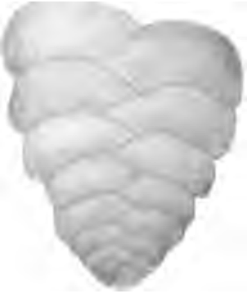

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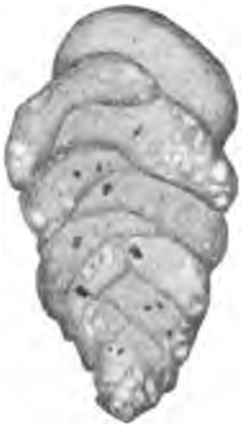
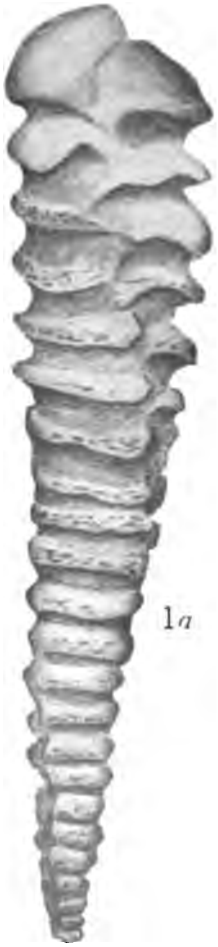
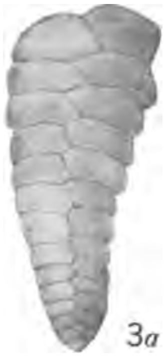


4*a*



1*a*

3*b*



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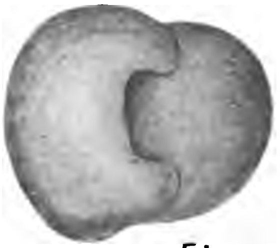
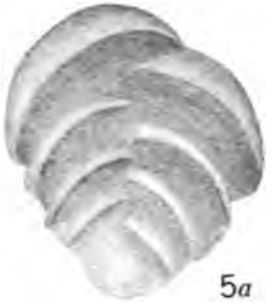


5*b*



5*a*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

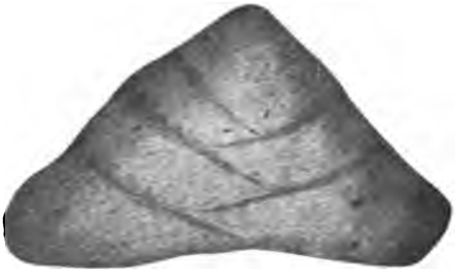
FOR EXPLANATION OF PLATE SEE PAGE 513

## PLATE 24.

FIG. 1. *Textularia vertebralis.* × 23. *a*, front view; *b*, apertural view.
2. *Textularia semialata.* × 50. Megalospheric form.
3. *Textularia semialata.* × 50. Microspheric form. *a*, front view; *b*, apertural view.
4. *Textularia immensa.* × 9. *a*, front view; *b*, apertural view.
5. *Textularia excavata.* × 20. *a*, front view; *b*, apertural view.

PLATE 25.

FIG. 1. *Textularia trochus.* × 35. *a*, front view; *b*, ventral view; *c*, dorsal view.
2. *Textularia conica.* × 35. *a*, front view; *b*, ventral view.
3. *Bigenerina pennatula.* × 35. *a*, front view; *b*, apertural view.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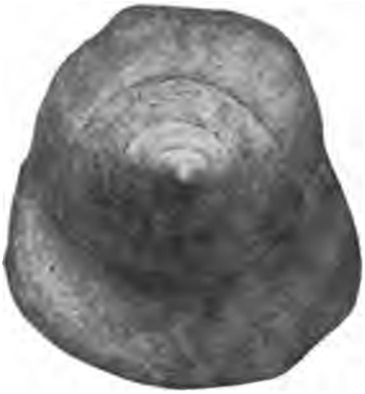
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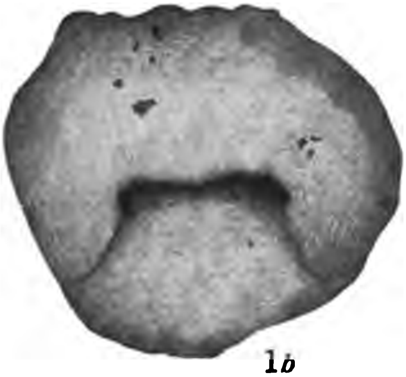
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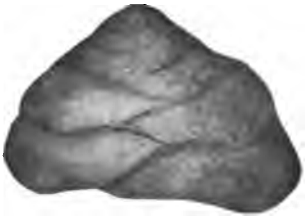
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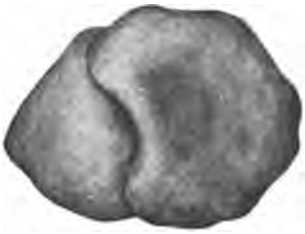
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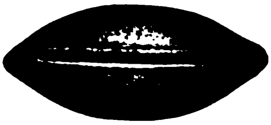
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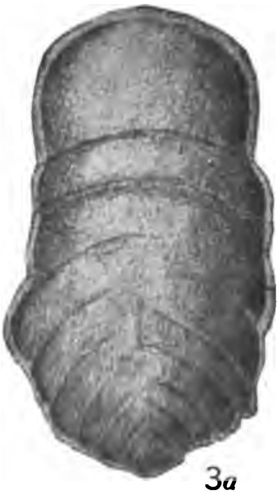
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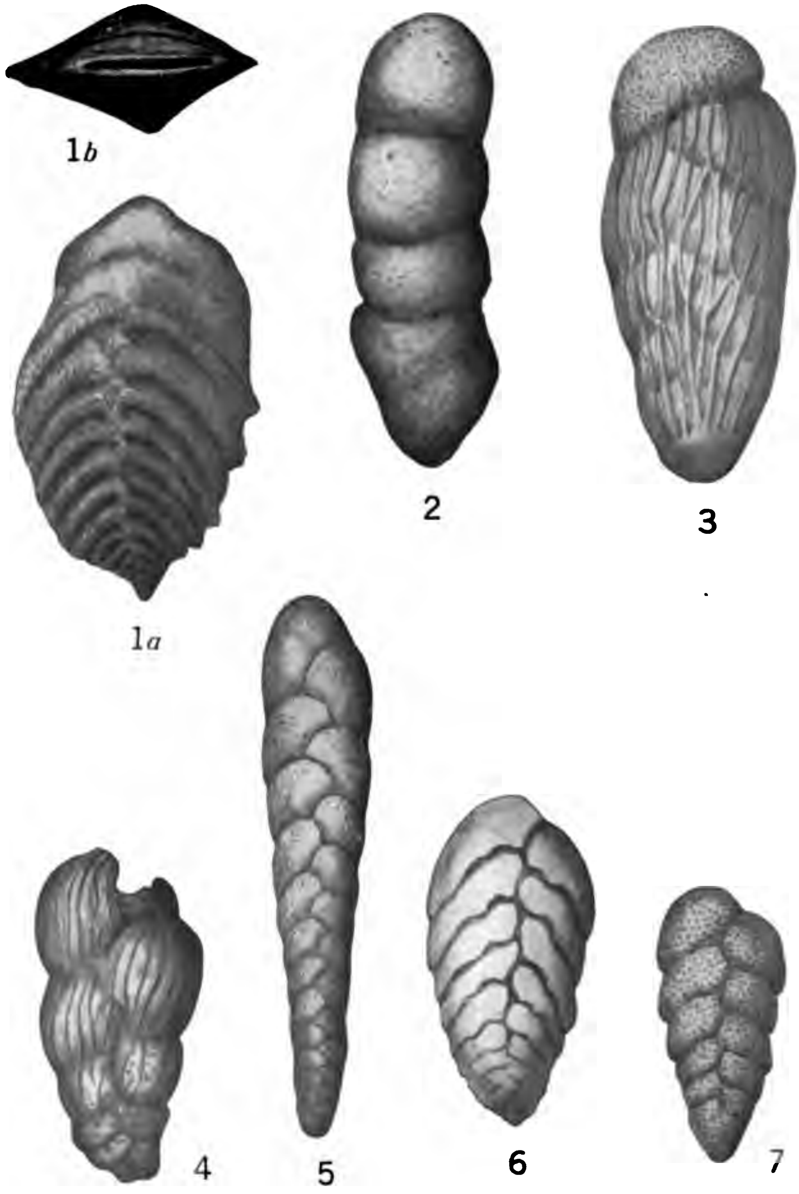
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 514.



Foraminifera of the Philippine and Adjacent Seas.

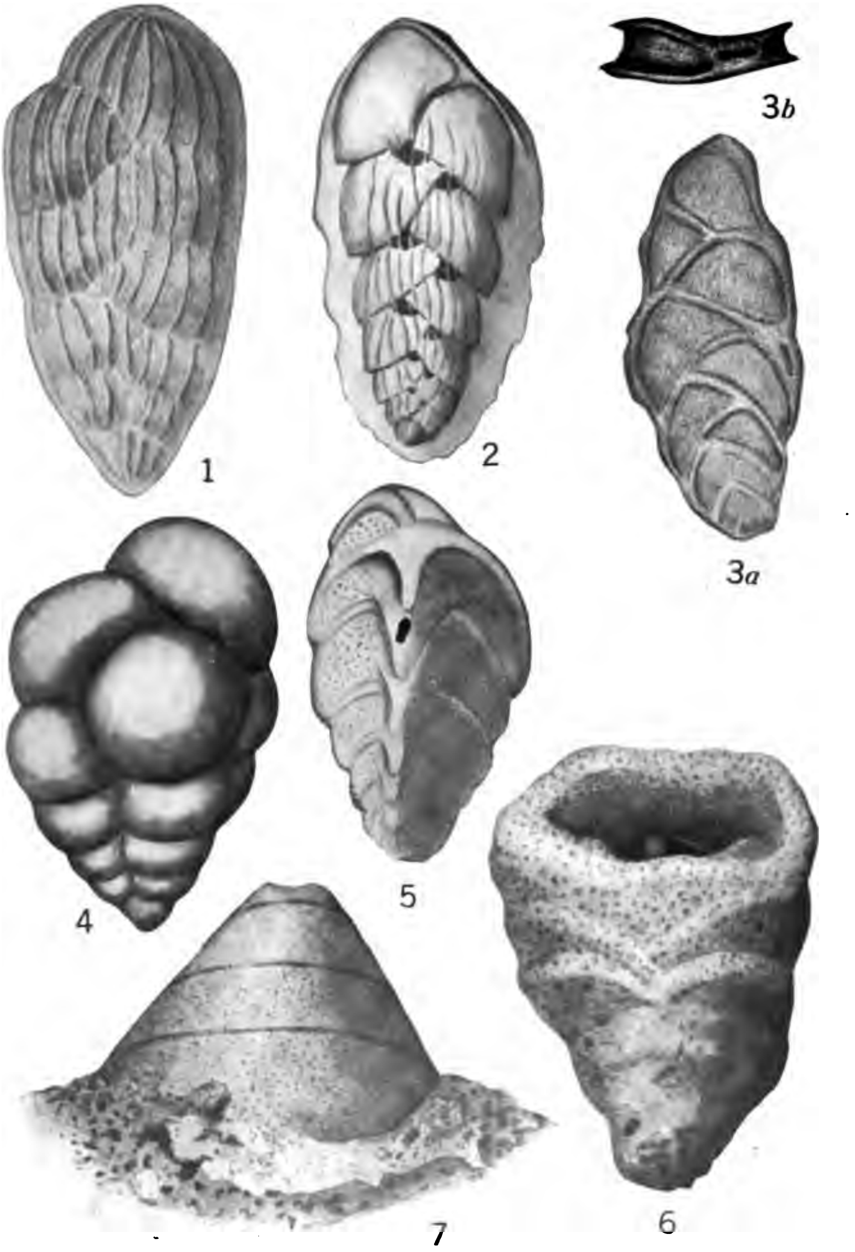
For explanation of plate see page 515.

## PLATE 26.

FIG. 1. *Bigenerina capreolus.* × 25. *a*, front view; *b*, apertural view.
2. *Bigenerina nodosaria.* × 35.
3. *Bolivina amygdalaeformis.* × 50.
4. *Bolivina karreriana.* × 35.
5. *Bolivina punctata.* × 35.
6. *Bolivina dilatata.* × 35.
7. *Bolivina compacta.* × 35.

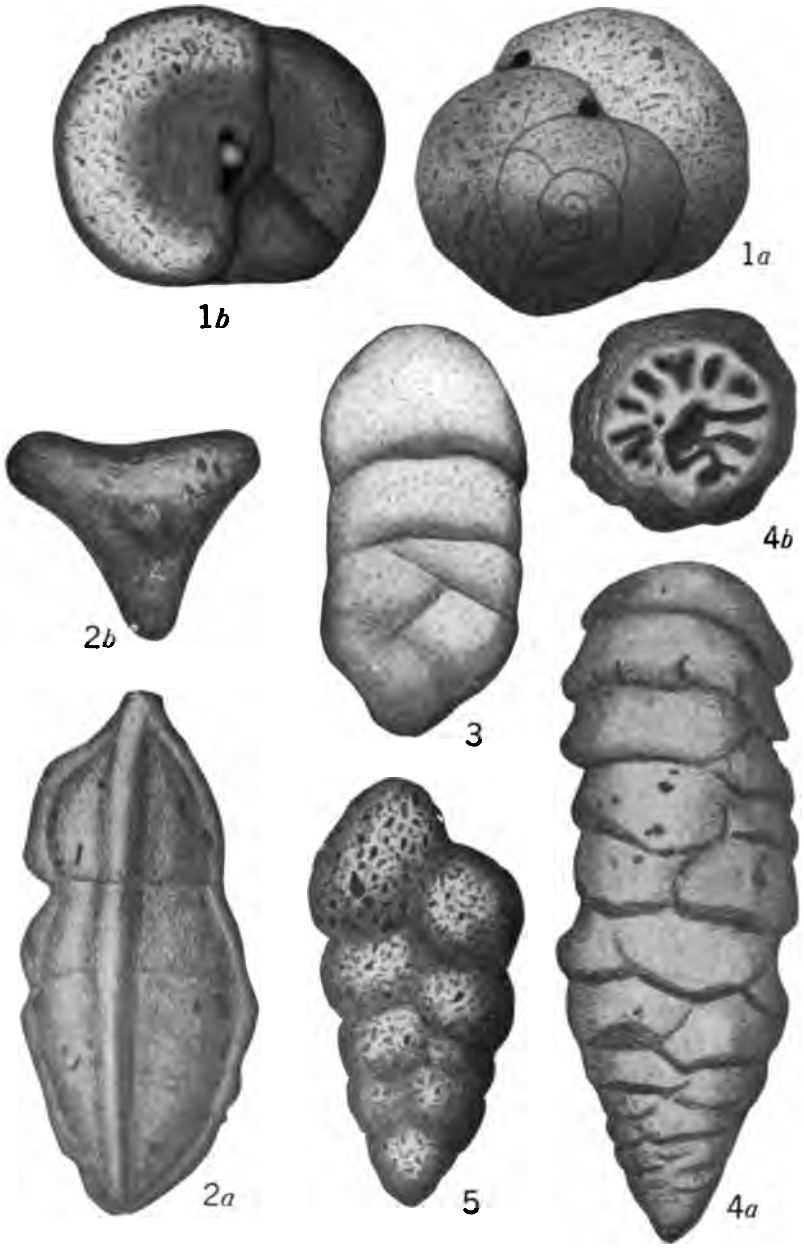
## PLATE 27.

FIG. 1. *Bolivina karreriana*, var. *carinata*. × 50.
2. *Bolivina hantkeniana*. × 35.
3. *Bolivina sculpturata*. × 50. *a*, front view; *b*, apertural view.
4. *Verneuilina bradyi*. × 75.
5. *Verneuilina spinulosa*. × 75.
6. *Verneuilina affixa*. × 35.
7. *Valvulina conica*. × 75.



Foraminifera of the Philippine and Adjacent Seas.

For explanation of plate see page 516.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

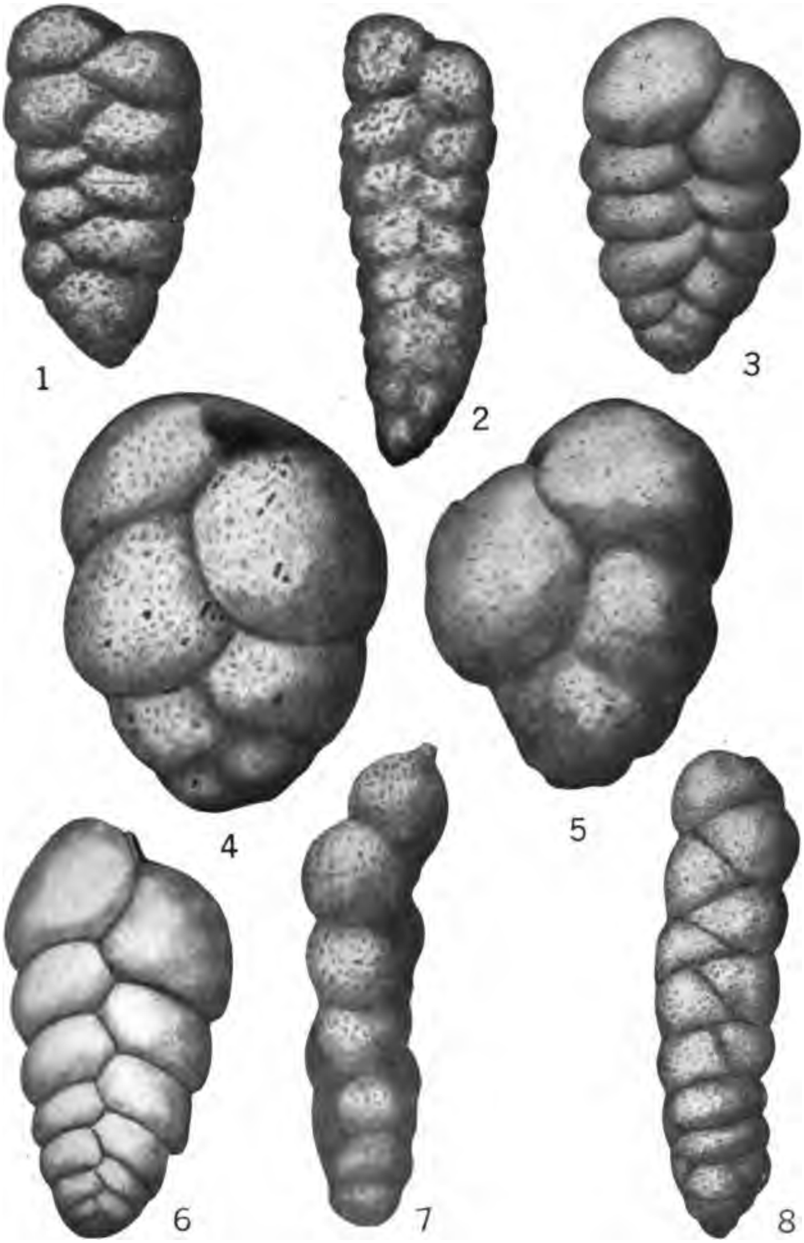
FOR EXPLANATION OF PLATE SEE PAGE 517.

## PLATE 28.

FIG. 1. *Valvulina fusca.* × 60. *a*, dorsal view; *b*, ventral view.
2. *Tritaxia tricarinata.* × 25. *a*, front view; *b*, apertural view.
3. *Tritaxia indiscreta.* × 35.
4. *Tritaxilina caperata.* × 25. *a*, front view: *b*, apertural view.
5. *Gaudryina scabra.* × 35.

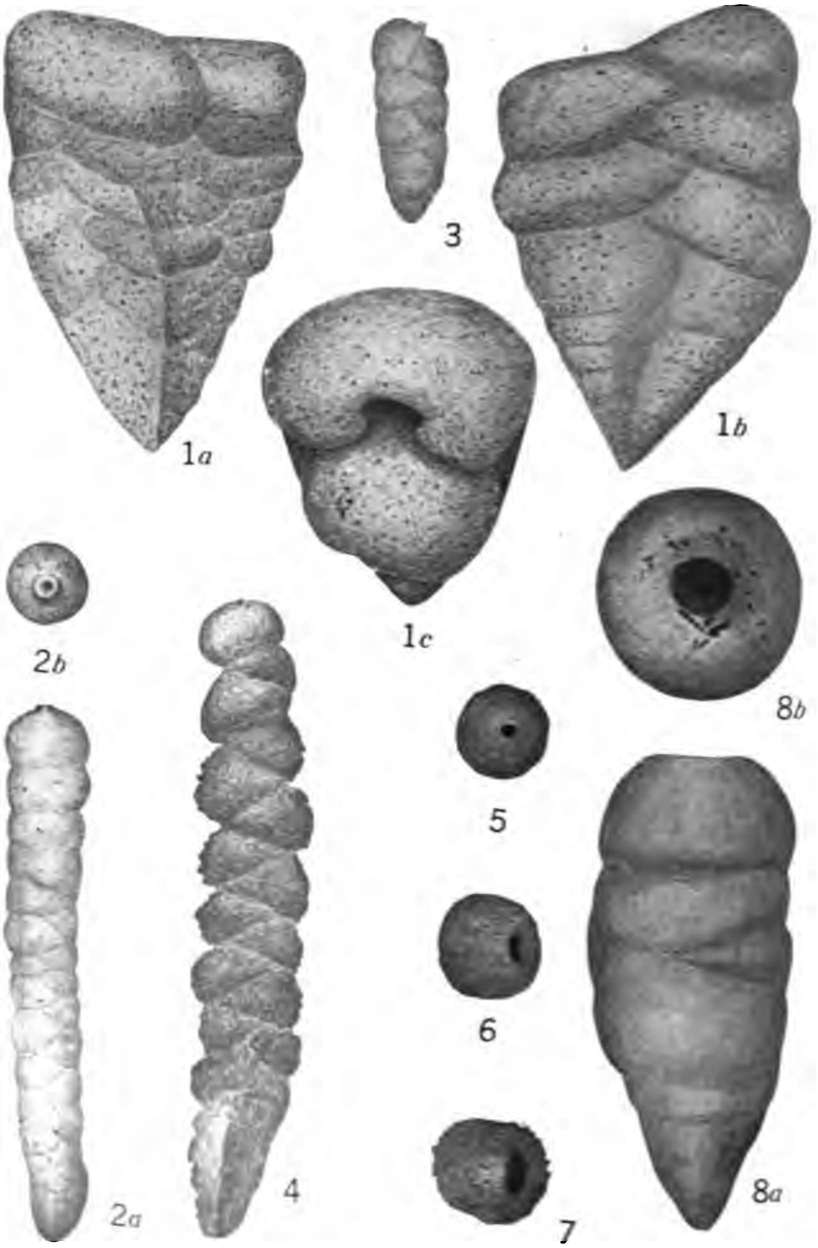
## PLATE 29.

FIG. 1. *Gaudryina flintii.* × 20.
2. *Gaudryina quadrangularis.* × 20.
3. *Gaudryina bradyi.* × 75.
4, 5. *Gaudryina pauperecula.* × 35.
6. *Gaudryina baccata.* × 75.
7. *Gaudryina apicularis.* × 75.
8. *Gaudryina pseudofiliformis.* × 75.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 518.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

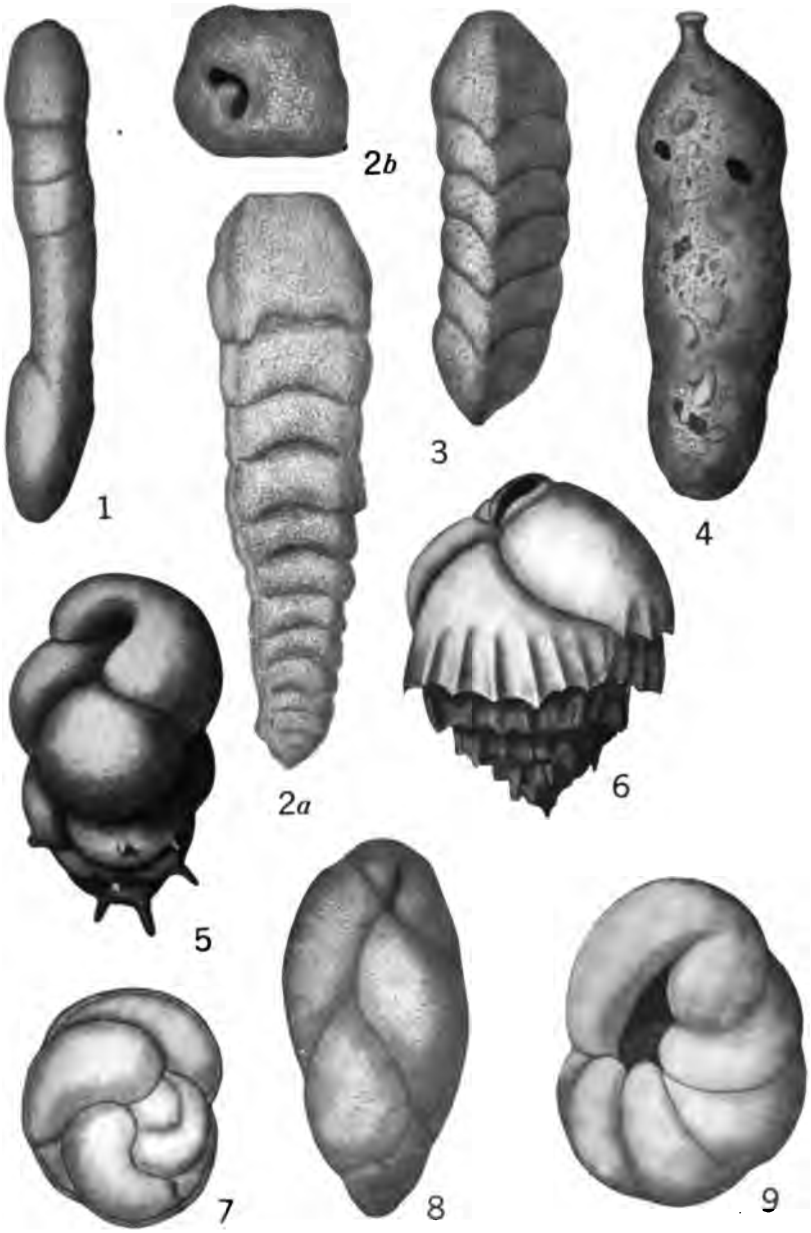
FOR EXPLANATION OF PLATE SEE PAGE 512.

## PLATE 30.

FIG. 1. *Gaudryina robusta.* × 18. *a*, ventral view; *b*, dorsal view; *c*, apertural view.
2. *Clavulina primaeva.* × 25. *a*, front view; *b*, apertural view.
3. *Clavulina primaeva.* × 25. Young form still in biserial stage.
4. *Gaudryina attenuata.* × 25.
5, 6. *Clavulina primaeva.* × 25. Apertures of biserial stage.
7. *Clavulina primaeva.* × 25. Aperture of adult.
8. *Clavulina rotundata.* × 25. *a*, front view; *b*, apertural view.

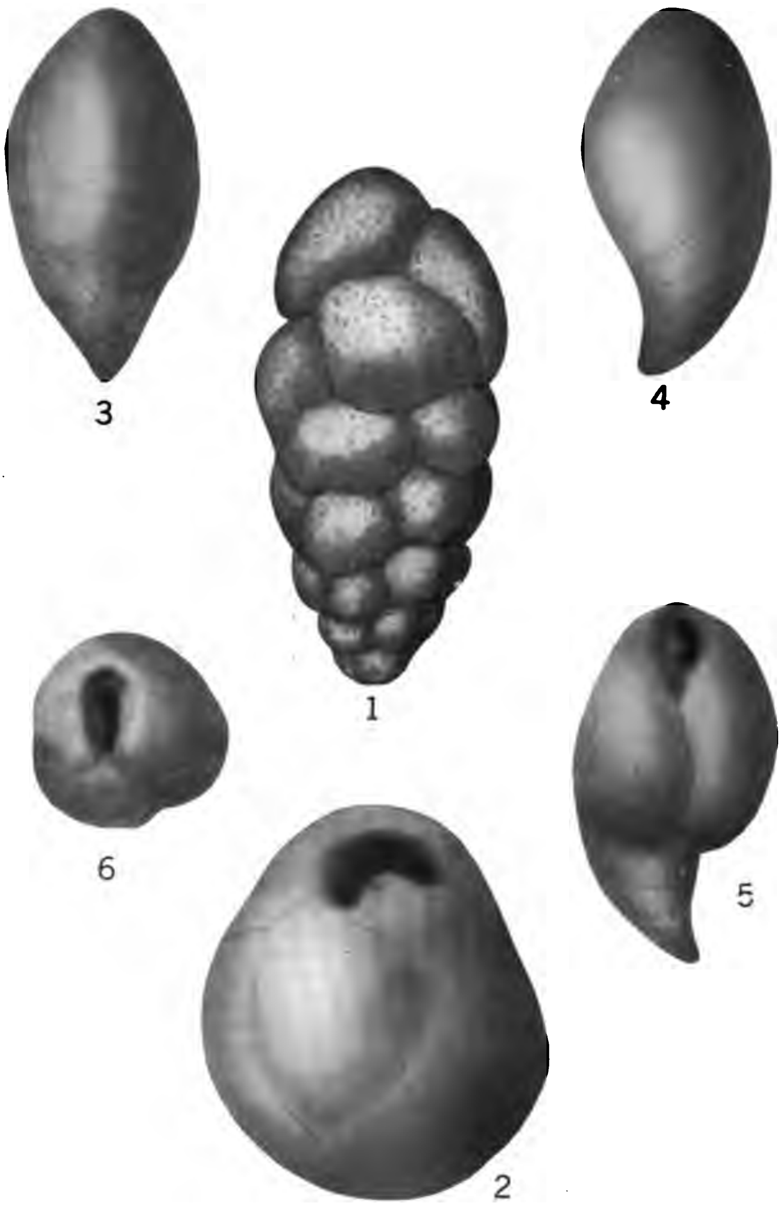
## PLATE 31.

FIG. 1. *Clavulina communis.* × 35.
2. *Clavulina difformis.* × 50. *a*, front view; *b*, apertural view.
3. *Clavulina angularis.* × 35.
4. *Clavulina bradyi.* × 35.
5. *Bulimina aculeata.* × 75.
6. *Bulimina inflata.* × 75.
7. *Cassidulina laevigata.* × 75.
8. *Bulimina pupoides.* × 75.
9. *Buliminella contraria.* × 75.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 520.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 521.

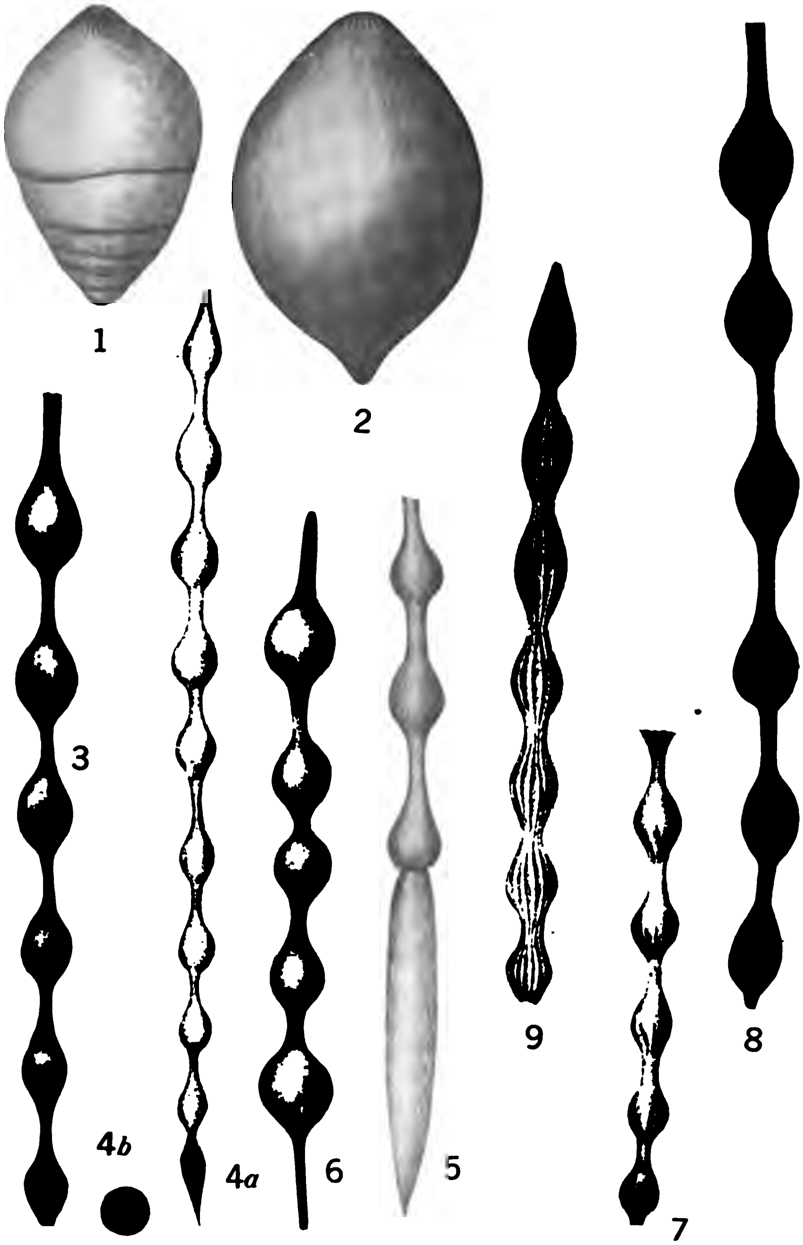
## PLATE 32.

FIG. 1. *Verneuilina polystropha*, side view. × 20.

2. *Cassidulina subglobosa*, front view. × 35.
3. *Virgulina cornuta*, rear view. × 50.
4. *Virgulina cornuta*, side view. × 50.
5. *Virgulina cornuta*, front view. × 50.
6. *Virgulina cornuta*, apertural view. × 50.

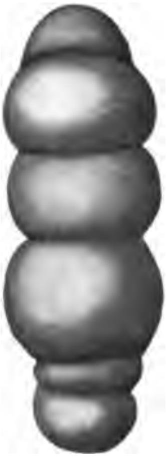
### PLATE 33.

FIG. 1. *Nodosaria* (*Glandulina*) *laevigata*. × 50. D5178.
2. *Nodosaria* (*Glandulina*) *laevigata*, var. *striatula*. × 60. D5236.
3. *Nodosaria pyrula*. × 33. D5201.
4. *Nodosaria pyrula*. × 12. D5201. *a*, apertural view; *b*, front view.
5. *Nodosaria pyrula*, with large proloculum. × 66. D5259.
6, 7. *Nodosaria pyrula*, var. *semirugosa*. × 12.
8. *Nodosaria pyrula*, var. *longi-costata*. × 12. D5388.
9. *Nodosaria pyrula*, var. *longi-costata*. × 33.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 522.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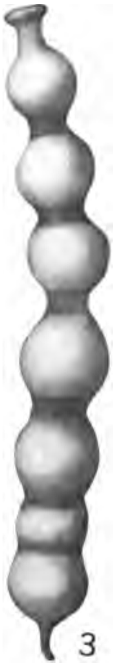
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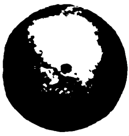
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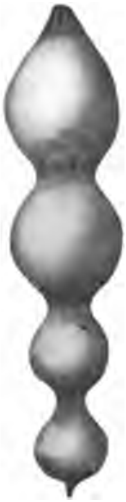
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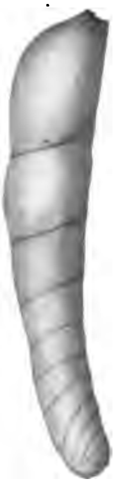
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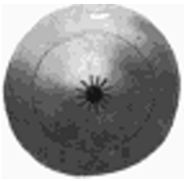
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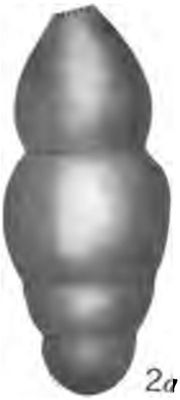
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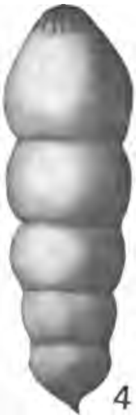
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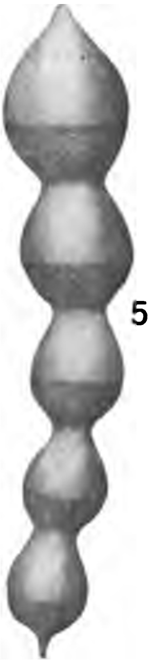
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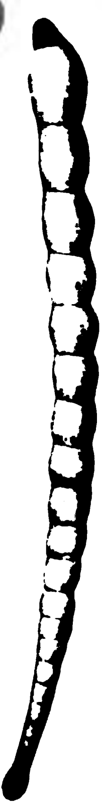
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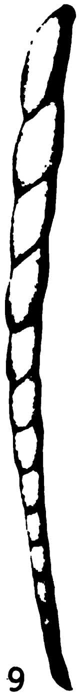

9

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

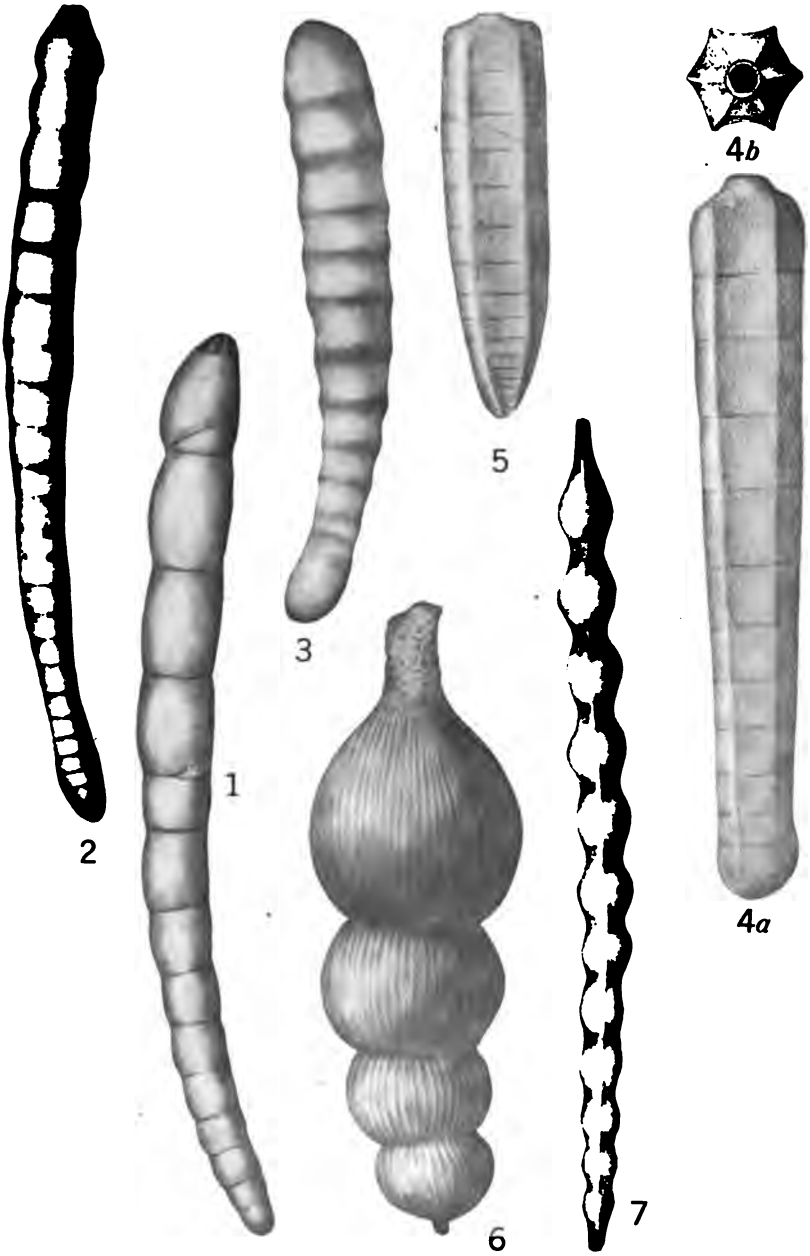
FOR EXPLANATION OF PLATE SEE PAGE 523.

## PLATE 34.

Fig. 1. *Nodosaria annulata.* × 66.
2. *Nodosaria annulata.* × 66. D5626. *a*, apertural view; *b*, front view.
3. *Nodosaria insecta.* × 33. D5236.
4. *Nodosaria radicula.* × 33. D5586.
5. *Nodosaria soluta.* × 10. D5385. *a*, apertural view; *b*, front view.
6. *Nodosaria soluta.* × 10.
7. *Nodosaria communis.* × 33. D5236.
8. *Nodosaria consobrina*, var. *emaciata.* × 20.
9. *Nodosaria filiformis.* × 20.

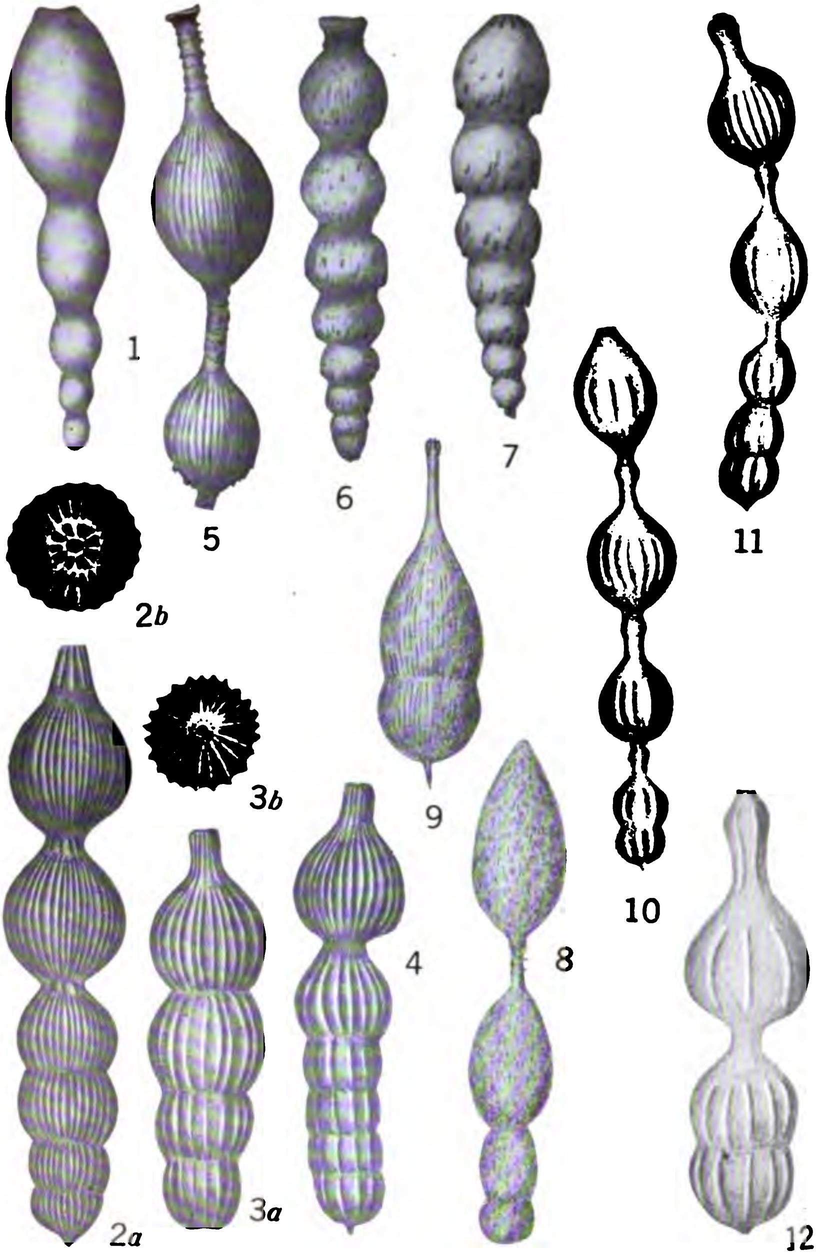
## PLATE 35.

FIG. 1. *Nodosaria consobrina*, var. *emaciata*. × 33.
2. *Nodosaria japonica*. × 10.
3. *Nodosaria antennula*. × 16. D5236.
4. *Nodosaria subpolygona*. × 20. D5318. *a*, apertural view; *b*, front view megalospheric.
5. *Nodosaria subpolygona*. × 20. D5318. Microspheric.
6. *Nodosaria scalaris*. × 66.
7. *Nodosaria catenulata*. × 33.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 524.



Foraminifera of the Philippine and Adjacent Seas.

For explanation of plate see page 525.

## PLATE 36.

FIG. 1. *Nodosaria subtertenuata.* × 33. D5236.

2. *Nodosaria subscalaris.* × 16. D5178. *a*, apertural view; *b*, front view.

3. *Nodosaria subscalaris*, var. *paucicostata.* × 22. D5133. *a*, apertural view; *b*, front view.

4. *Nodosaria subscalaris*, var. *paucicostata.* × 22. D5133.

5. *Nodosaria milletii.* × 33. D5281.

6. *Nodosaria lepidula.* × 33. D5236.

7. *Nodosaria lepidula*, var. *hispidula.* × 33. D5236.

8. *Nodosaria substriatula.* × 33. D5123. Adult with apertural end broken.

9. *Nodosaria substriatula.* × 66. D5112. Two-chambered stage.

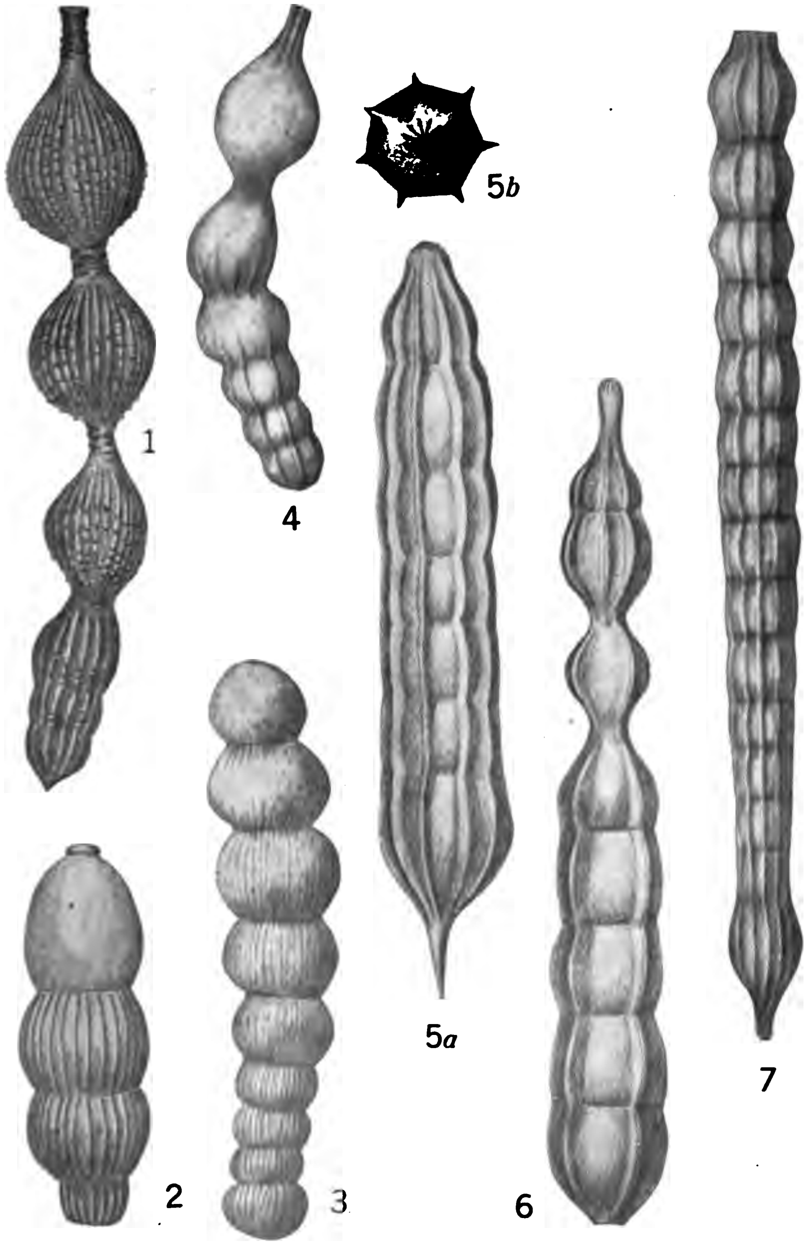
10. *Nodosaria pauciloculata.* × 22. D5201.

11. *Nodosaria pauciloculata.* × 22. D5201.

12. *Nodosaria pauciloculata.* × 50. D5371.

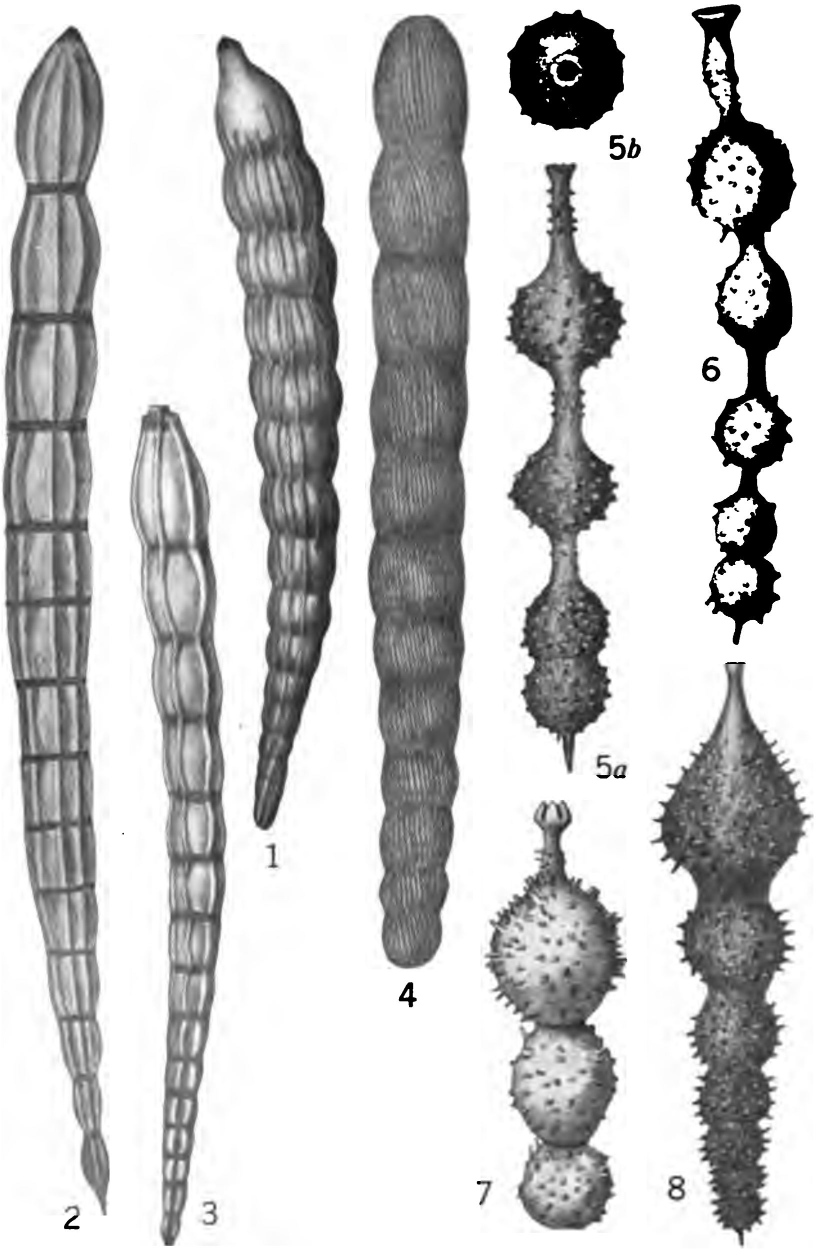
## PLATE 37.

FIG. 1. *Nodosaria sublineata.* × 22. D5586.
2. *Nodosaria perversa.* × 45. D5311.
3. *Nodosaria subperversa.* × 33. D5236.
4. *Nodosaria laevicostata.* × 66. D5178.
5. *Nodosaria raphanus.* × 16. *a*, apertural view; *b*, front view.
6. *Nodosaria raphanus.* × 16. D5272.
7. *Nodosaria raphanus.* × 16.



Foraminifera of the Philippine and Adjacent Seas.

For explanation of plate see page 526.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

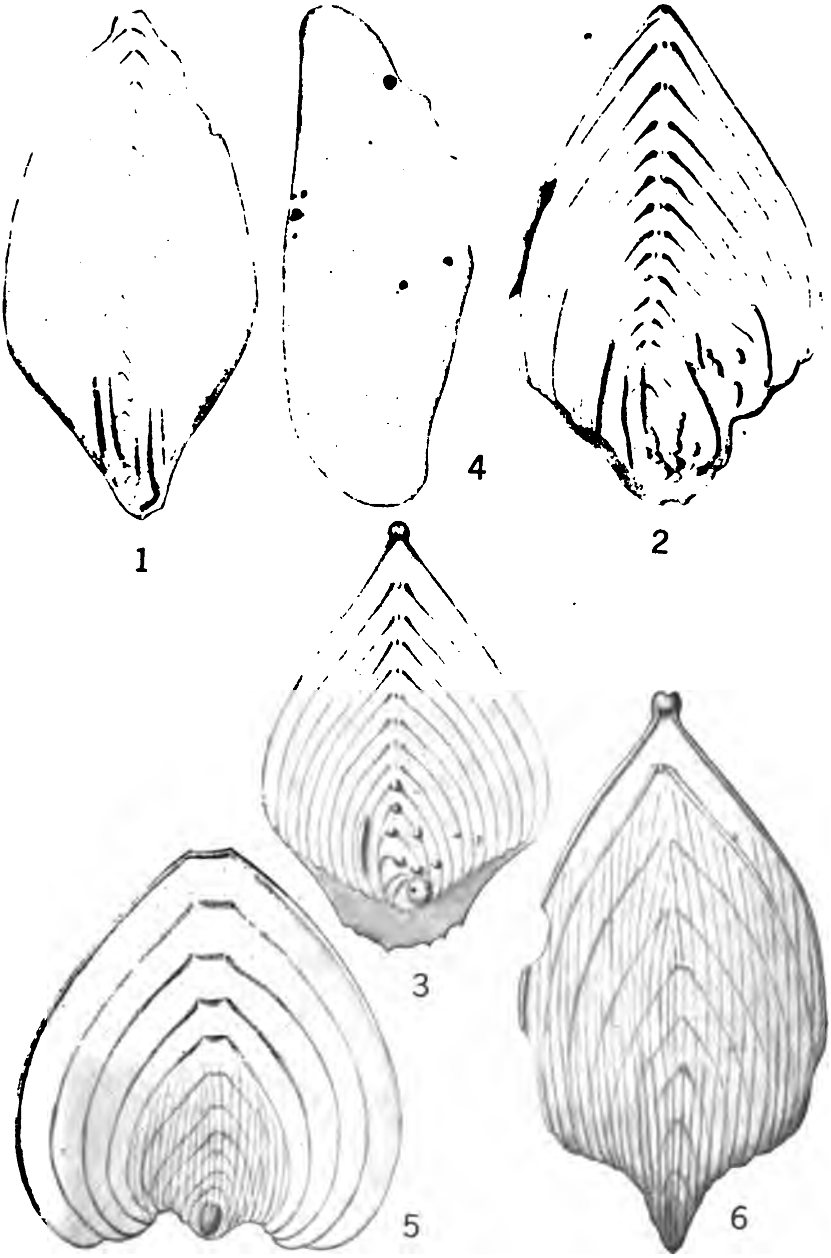
FOR EXPLANATION OF PLATE SEE PAGE 527.

## PLATE 38.

FIG. 1. *Nodosaria obliqua.* × 33.
2. *Nodosaria vertebralis.* × 25.
3. *Nodosaria vertebralis.* × 20.
4. *Nodosaria spirostriolata.* × 12. D5236.
5. *Nodosaria hirsuta.* × 22. D 5201. *a*, apertural view; *b* front view.
6. *Nodosaria hirsuta.* × 20.
7. *Nodosaria hirsuta*, var. *aculeata.* × 33.
8. *Nodosaria hirsuta*, var. *aculeata.* × 33. D5259.

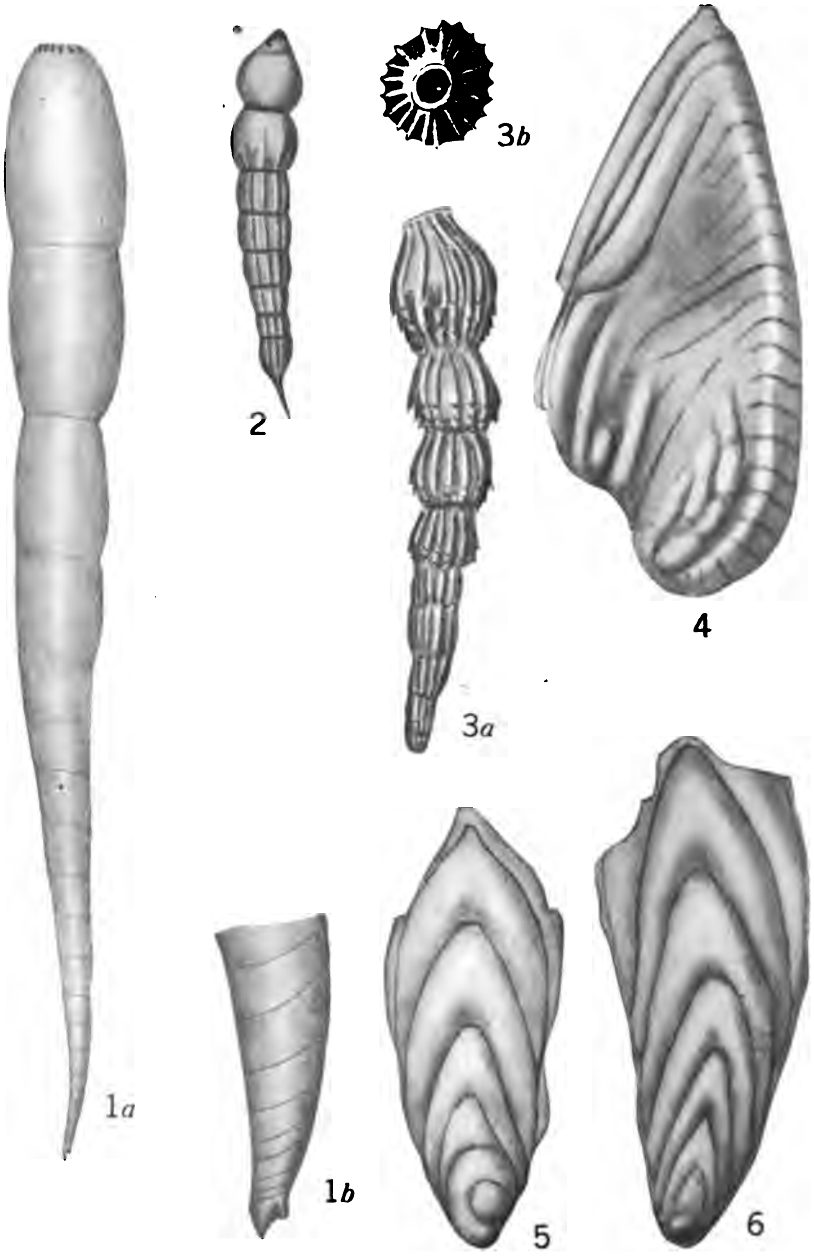
## PLATE 39.

FIG. 1. *Frondicularia philippinensis.* × 20. D5425.
2. *Frondicularia philippinensis.* × 20. D5429.
3. *Frondicularia philippinensis.* × 20. D5201.
4. *Frondicularia plicata* (?). × 12. D5584.
5. *Frondicularia annularis.* × 20. D5382.
6. *Frondicularia annularis,* var. *longistriata.* × 33. D5110.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 528.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

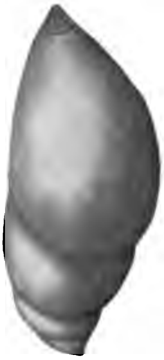
FOR EXPLANATION OF PLATE SEE PAGE 528.

## PLATE 40.

FIG. 1. *Vaginulina acicula.* D5613. *a*, × 30; *b*, initial end. × 100.
2. *Nodosaria vertebralis.* × 25. H4898.
3. *Vaginulina protumida.* × 25. D5236. *a*, apertural view; *b*, front view.
4. *Frondicularia plicata.* × 20. D5301.
5. *Frondicularia inaequalis.* × 66. D5123.
6. *Frondicularia inaequalis.* × 33. D5652.

## PLATE 41.

**FIG.** 1. *Marginulina glabra*. × 66.
2. *Marginulina striatula*. × 66.
3. *Vaginulina legumen*. × 33.
4. *Vaginulina legumen*, var. *elegans*. × 33.
5. *Marginulina costata*, megalospheric form. × 33.
6. *Marginulina costata*, megalospheric form. × 22.
7. *Marginulina costata*, microspheric form. × 22.
8. *Marginulina costata*, microspheric form. × 33.



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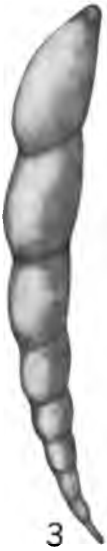

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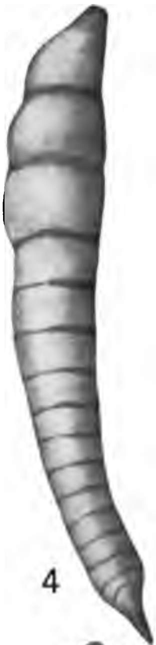

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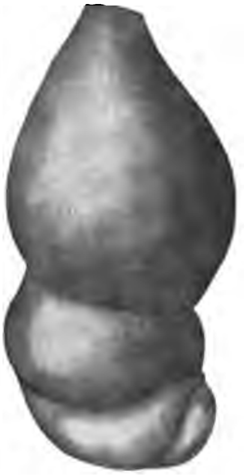

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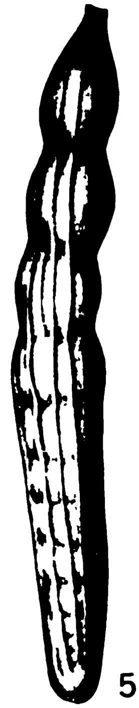

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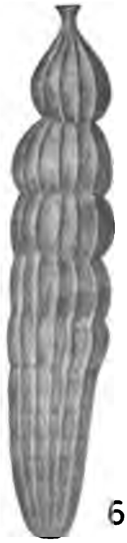

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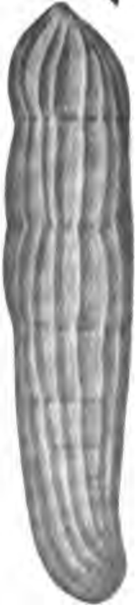

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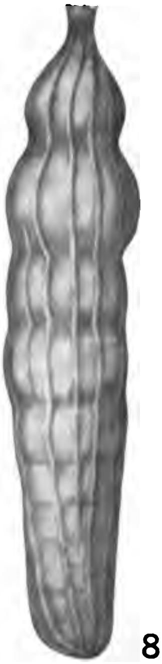

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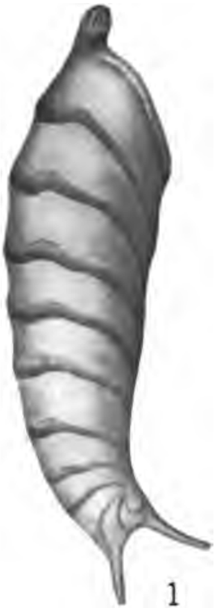
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 630.



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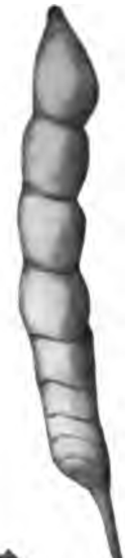

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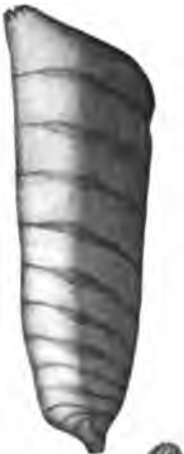

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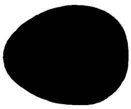

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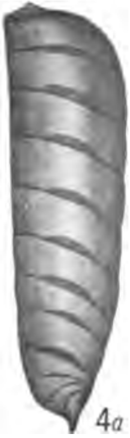

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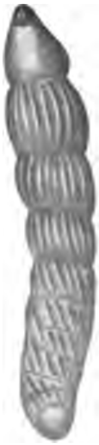

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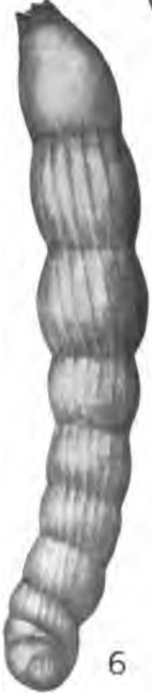

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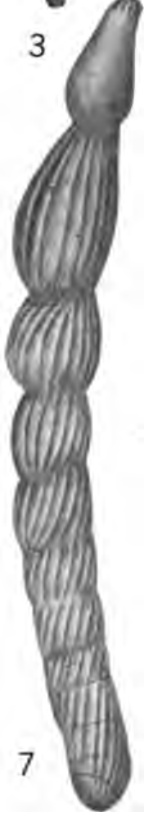

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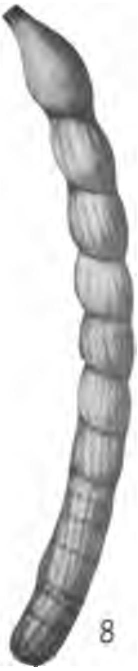

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FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

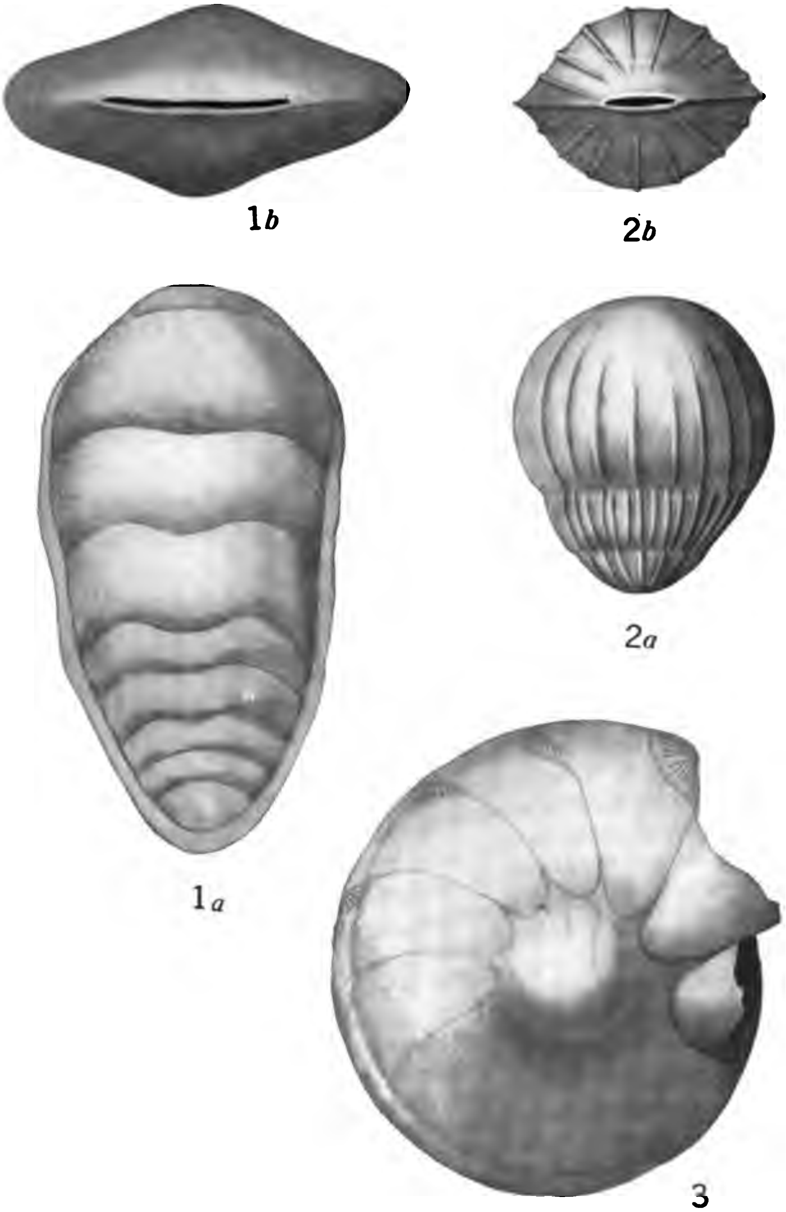
FOR EXPLANATION OF PLATE SEE PAGE 531

## PLATE 42.

FIG. 1. *Vaginulina spinigera.* × 33.
2. *Vaginulina margaritifera.* × 25.
3. *Vaginulina bradyi.* × 25.
4. *Vaginulina bradyi.* × 25. *a*, apertural view; *b*, front view.
5. *Vaginulina linearis*, microspheric form. × 50. D5569.
6. *Vaginulina linearis*, microspheric form. × 33. D5172.
7. *Vaginulina linearis*, microspheric form. × 50. D5569.
8. *Vaginulina linearis*, megalospheric form. × 33. D5133.

## PLATE 43.

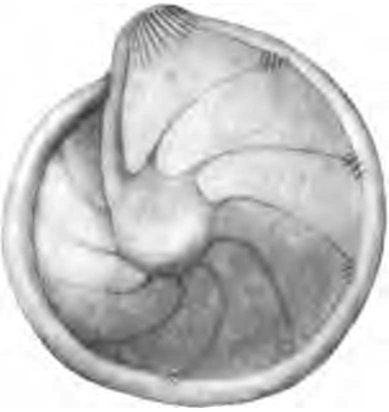
FIG. 1. *Lingulina grandis*. *a*, front view, × 12; *b*, apertural view, × 16.
2. *Lingulina costata*. *a*, front view, × 26; *b*, apertural view, × 26.
3. *Cristellaria rotulata*, var. *umbonata*. × 20.



1b 2b 2a 1a 3

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 532.



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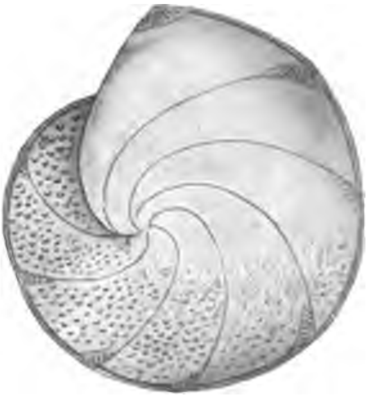

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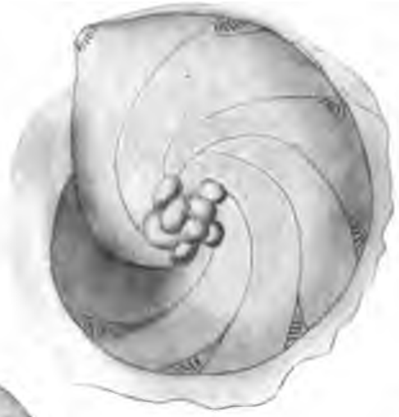

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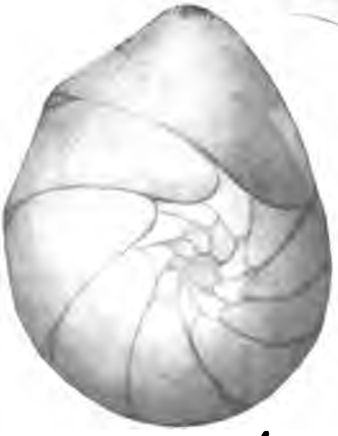

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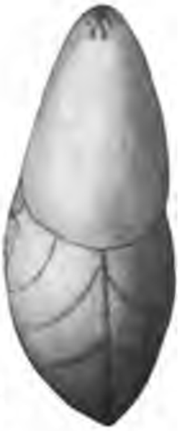


4b

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 533.

## PLATE 44.

FIG. 1. *Cristellaria orbicularis*, var. *subcarinata*. × 12.
2. *Cristellaria orbicularis*, var. *papillata*. × 12. D5152.
3. *Cristellaria orbicularis*, var. *subumbonata*. × 12. D5259.
4. *Cristellaria convergens*. *a*, side view, × 26; *b*, edge view, × 26.

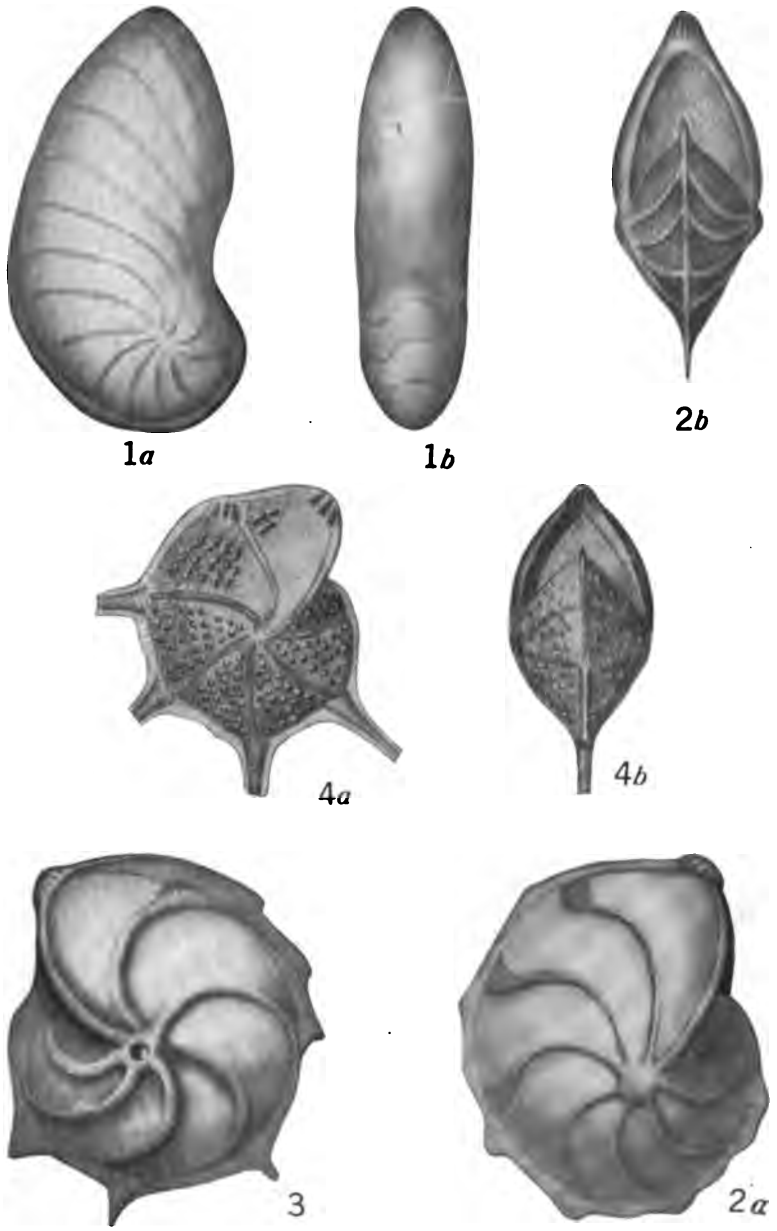
## PLATE 45.

FIG. 1. *Cristellaria gibba.* × 20. *a*, side view; *b*, edge view.

2. *Cristellaria calcar.* × 33. *a*, side view; *b*, edge view.

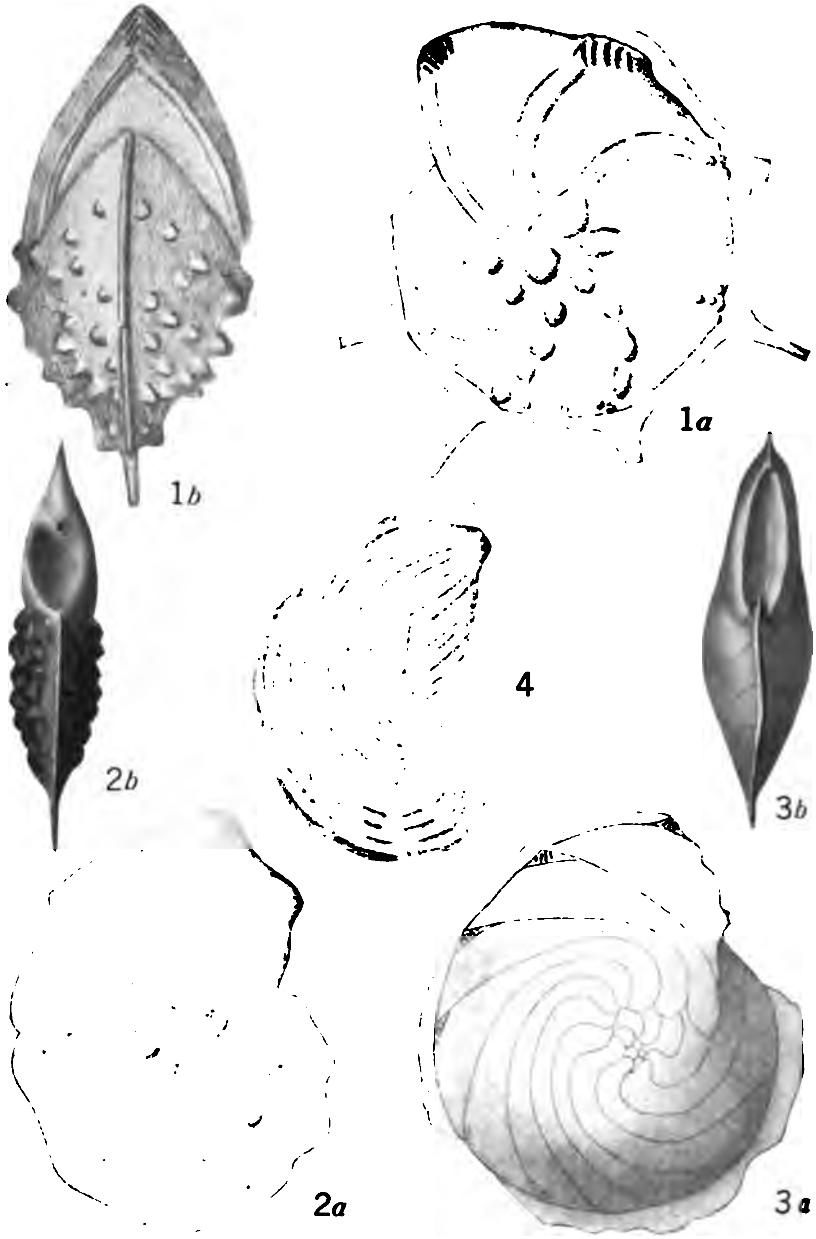
3. *Cristellaria calcarata.* × 26.

4. *Cristellaria echinata.* × 23. *a*, side view; *b*, edge view. D5423.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 534.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

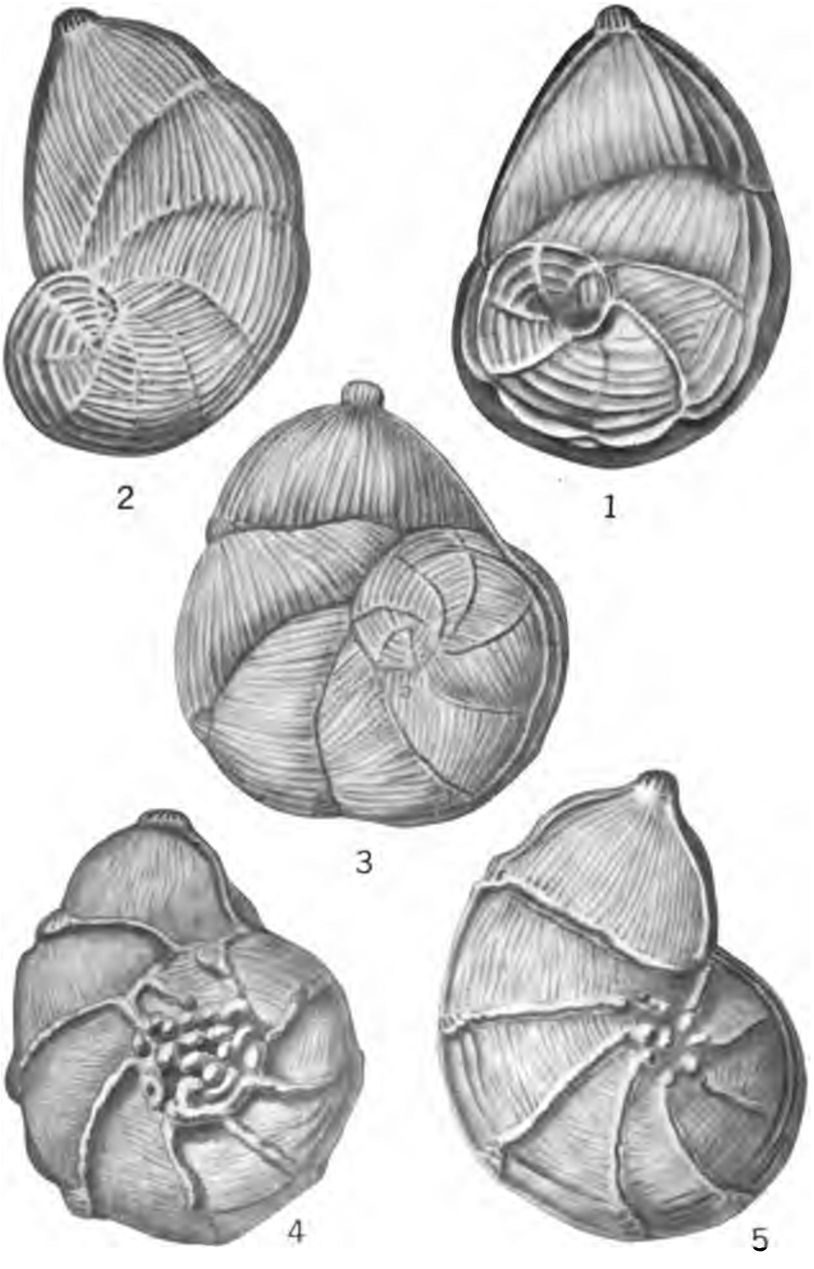
FOR EXPLANATION OF PLATE SEE PAGE 535.

## PLATE 46.

**FIG.** 1. *Cristellaria echinata.* × 23. *a*, side view; *b*, edge view. D5374.
2. *Cristellaria expansa.* × 26. *a*, side view; *b*, edge view. D5467.
3. *Cristellaria expansa*, var. *planulata.* × 16. *a*, side view; *b*, edge view.
4. *Cristellaria costata.* × 33. D5590.

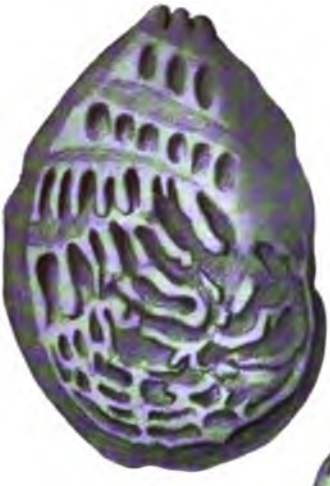
## PLATE 47.

FIG. 1. *Cristellaria costata.* × 33.
2, 3. *Cristellaria costata*, var. *multicosta.* × 26.
4, 5. *Cristellaria costata*, var. *subdecorata.* × 26.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 536.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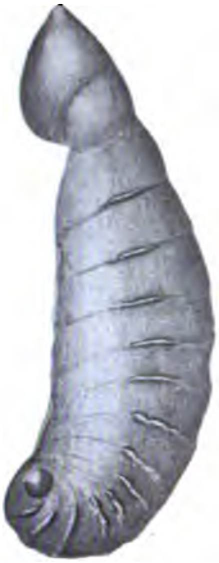
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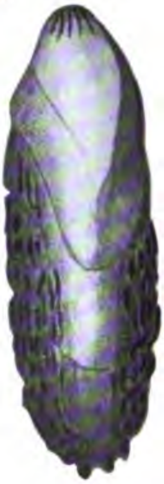
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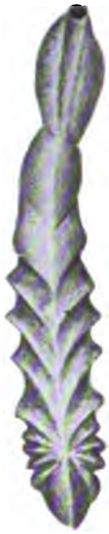
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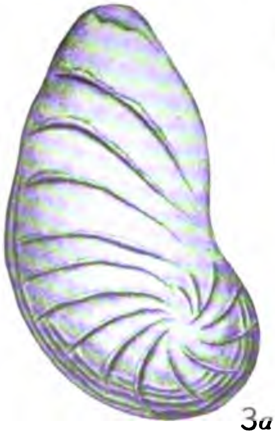
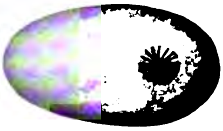
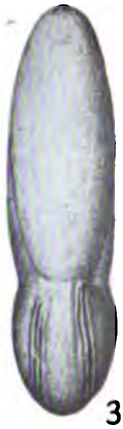

3*a*


3*c*


3*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 537.

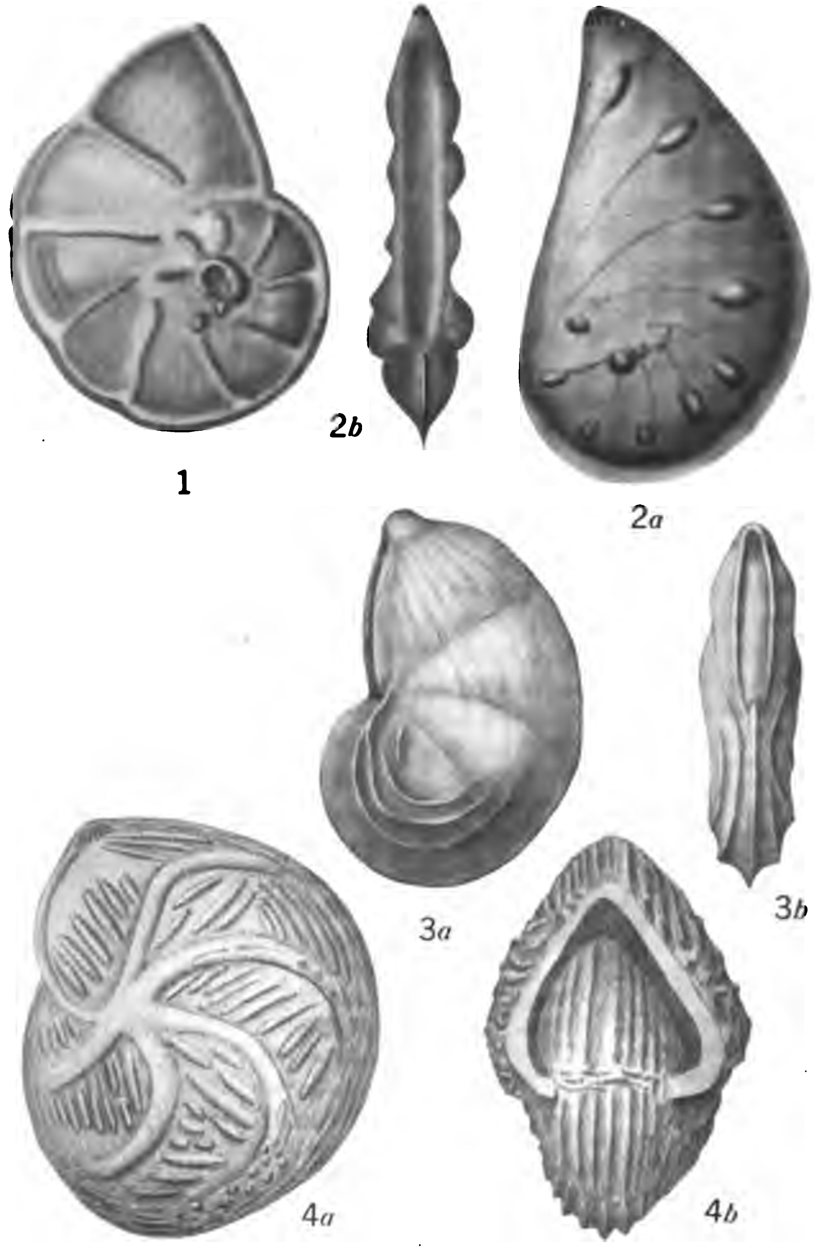
PLATE 48.

FIG. 1. *Cristellaria bradyi.* × 13. *a*, side view; *b*, edge view. D5313.
2. *Cristellaria cassinoides.* × 26. *a*, side view; *b*, edge view. D5381.
3. *Cristellaria dorso-costata.* × 13. *a*, side view; *b*, edge view; *c*, apertural view. D5268.

## PLATE 49.

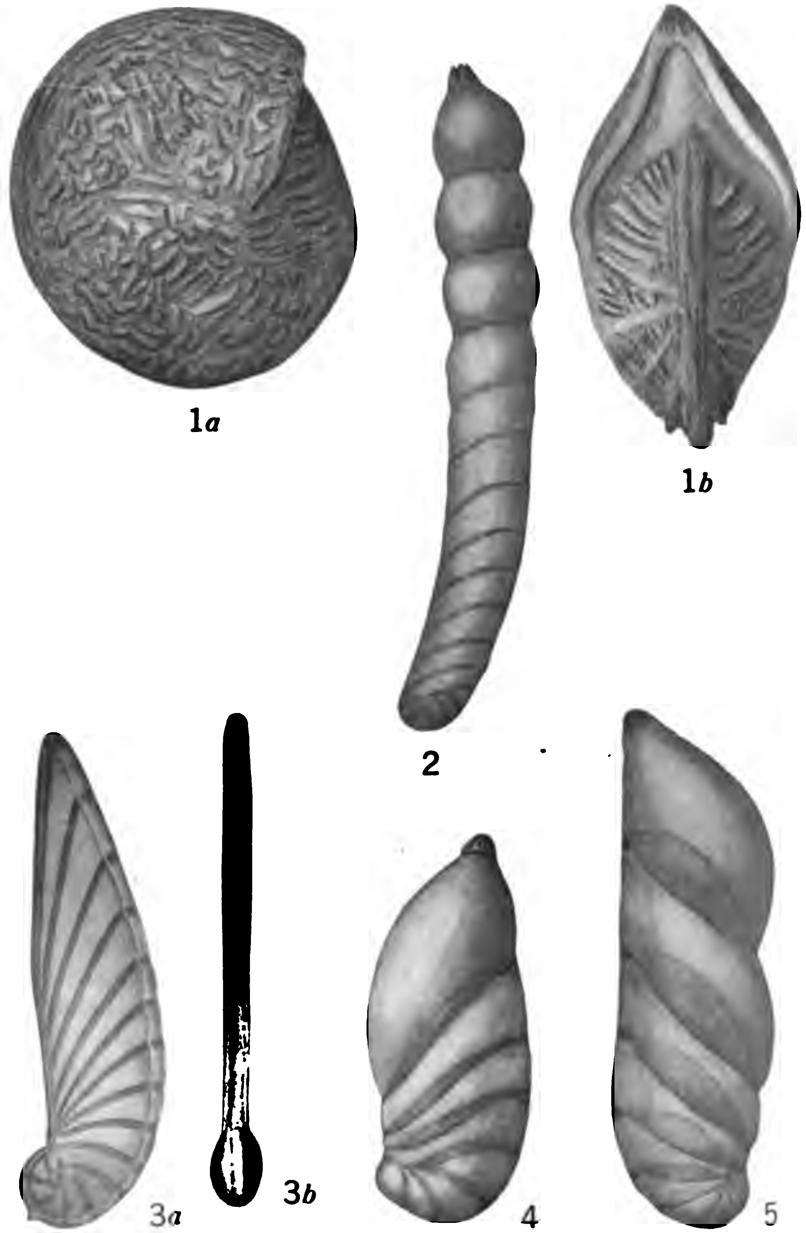
FIG. 1 *Cristellaria costata*, var. *sublaevis*. × 26. D5374.

2. *Cristellaria cassis*. × 26. *a*, side view; *b*, edge view.
3. *Cristellaria paucicostata*. × 40. *a*, side view; *b*, edge view. D5586.
4. *Cristellaria tumido-costata*. × 23. *a*, side view; *b*, edge view. D5570.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 538.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 539.

## PLATE 50.

FIG. 1. *Cristellaria tumido-costata*, var. *labyrinthica*. × 23. *a*, side view; *b*, edge view. D5567.

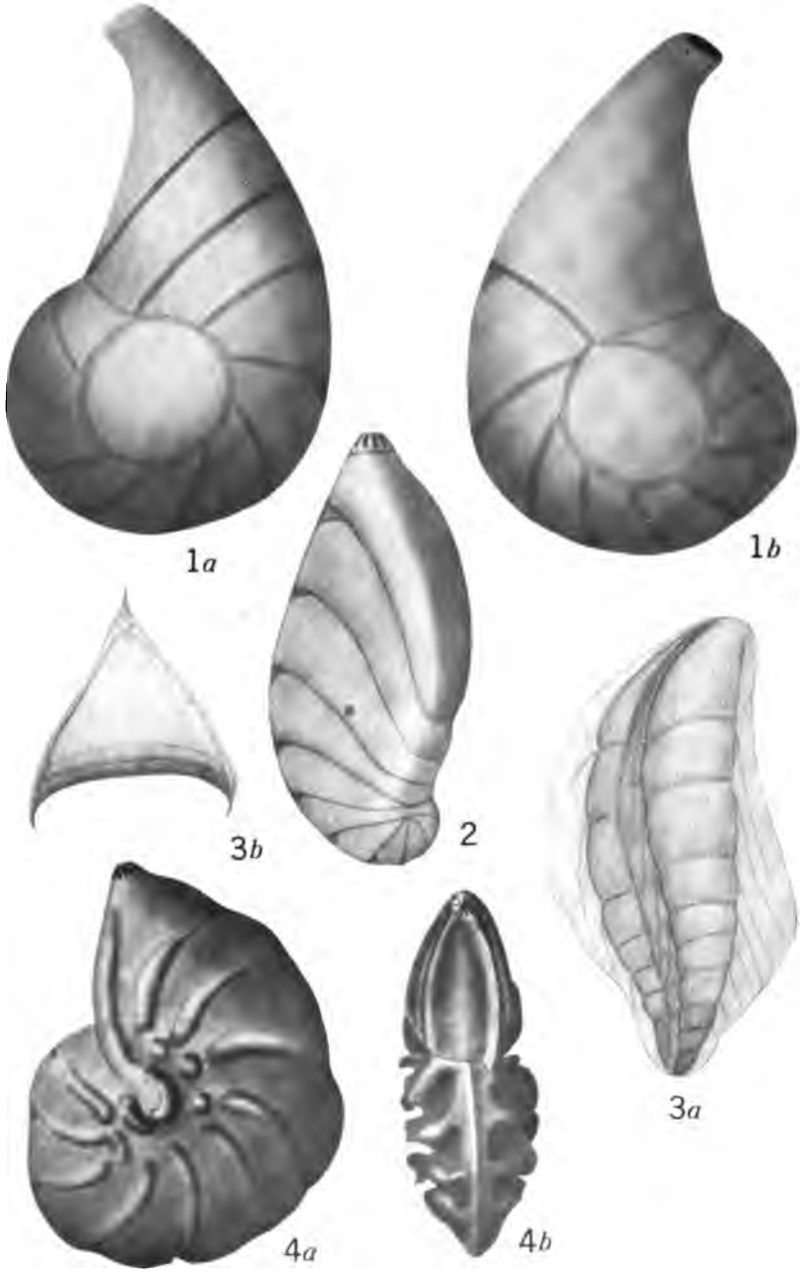
2. *Cristellaria tenuis*. × 50.

3. *Cristellaria tricarinella*. × 23. *a*, side view; *b*, edge view D5301.

4, 5. *Cristellaria crepidula*. × 33.

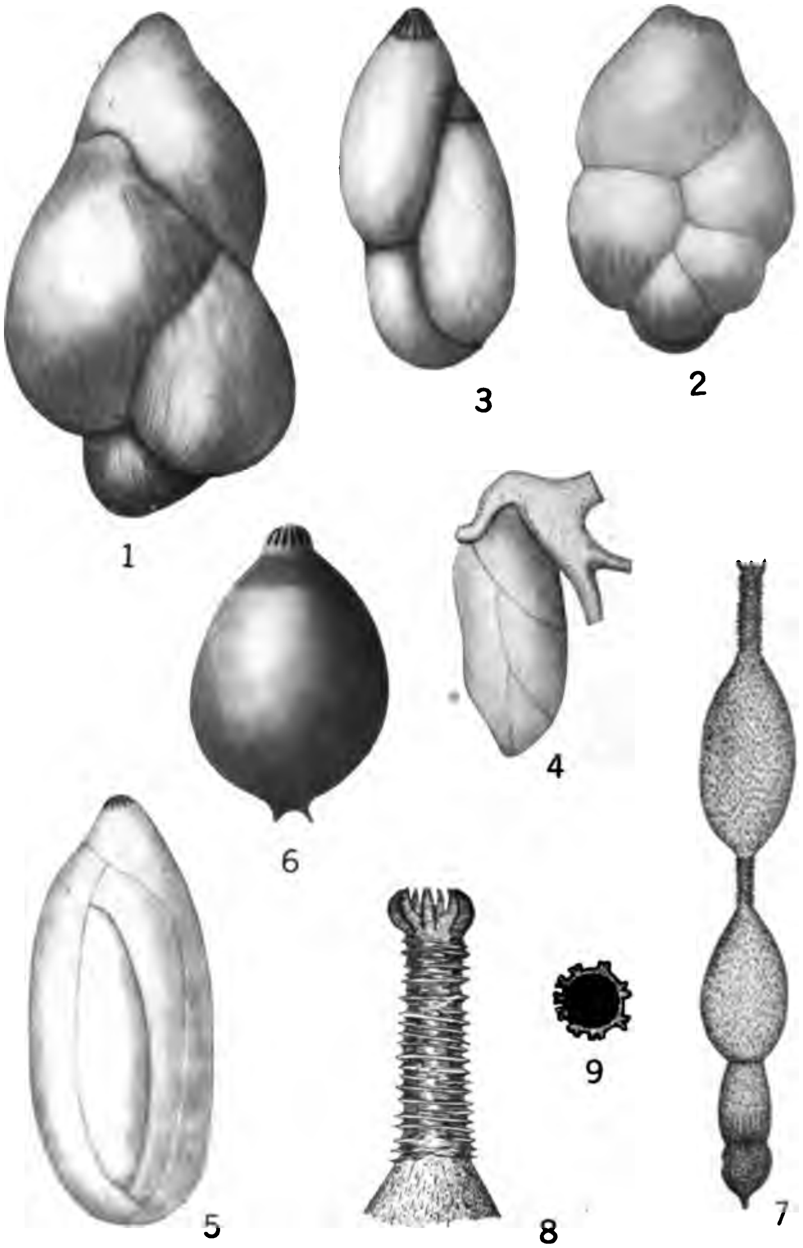
## PLATE 51.

FIG. 1. *Cristellaria helicinoides.* × 26. *a*, side view; *b*, reverse view. D 5301.
2. *Cristellaria italica.* × 26.
3. *Cristellaria italica*, var. *acuto-carinata.* × 26. *a*, side view; *b*, end view. D5523.
4. *Cristellaria helicina.* × 16. *a*, side view; *b*, edge view. D5272.



Foraminifera of the Philippine and Adjacent Seas.

For explanation of plate see page 540.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 541.

## PLATE 52.

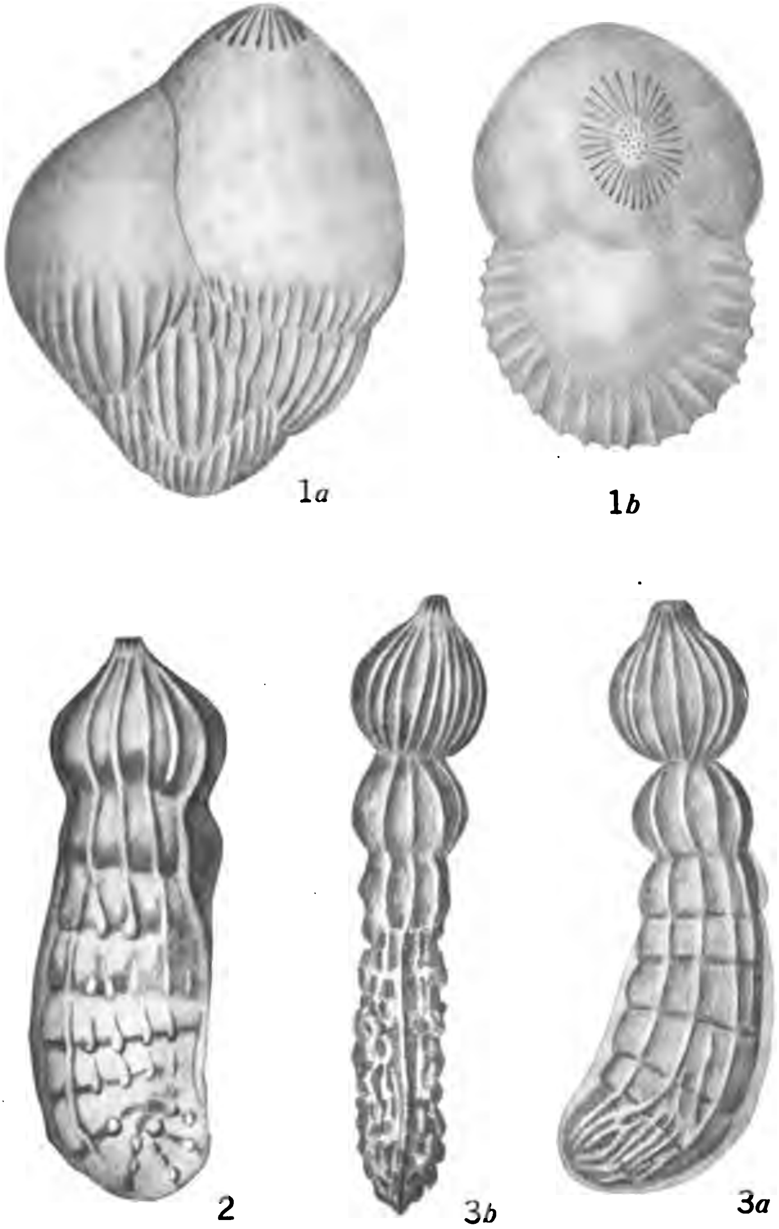
FIG. 1, 2. *Polymorphina problema*, var. *indica*. × 20. D5579.
3. *Polymorphina oblonga*. × 50.
4. *Polymorphina lactea*. var. *oblonga*. × 66. D5601.
5. *Polymorphina*, species. × 50.
6. *Lagena apiculata*. × 33.
7. *Nodosaria substriatula*. × 33. D5123.
8. *Nodosaria substriatula*. × 100, showing details of neck and aperture.
9. *Nodosaria substriatula*. × 100, aperture.

## PLATE 53.

FIG. 1. *Polymorphina problema*, var. *indica*, short form. × 23. D5579. *a*. side view; *b*, apertural view.

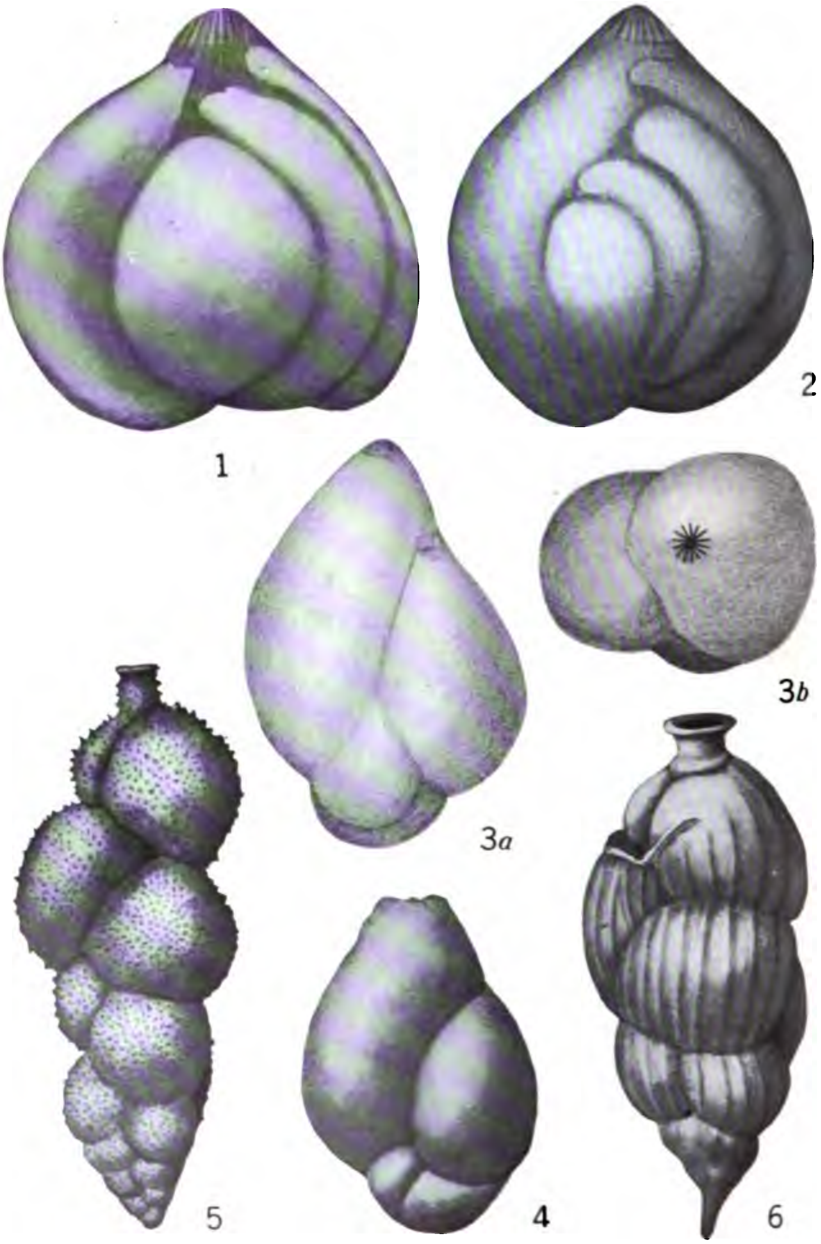
2. *Marginulina philippinensis*. × 33. D5217.

3. *Marginulina philippinensis*. × 13, D5220. *a*, side view; *b*, edge view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 542



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

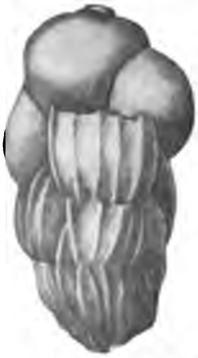
FOR EXPLANATION OF PLATE SEE PAGE 543.

## PLATE 54.

FIG. 1. *Polymorphina elegantissima.* × 66.
2. *Polymorphina elegantissima.* × 66.
3. *Polymorphina problema.* × 66. *a*, apertural view; *b*, front view.
4. *Polymorphina problema.* × 66.
5. *Uvigerina asperula.* × 66.
6. *Uvigerina striata.* × 66.

## PLATE 55.

FIG. 1. *Uvigerina pigmea.* × 33.
2. *Uvigerina tenuistriata.* × 66.
3. *Uvigerina schwageri.* × 66.
4. *Uvigerina schwageri.* × 66.
5. *Uvigerina schwageri.* × 40. *a*, apertural view; *b*, front view
6. *Uvigerina aculeata.* × 66.
7. *Uvigerina ampullacea.* × 66.
8. *Uvigerina asperula.* × 66.



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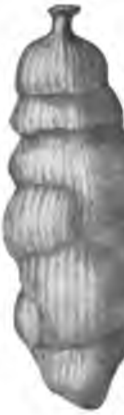

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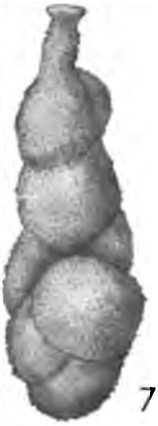

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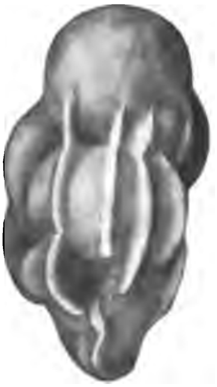

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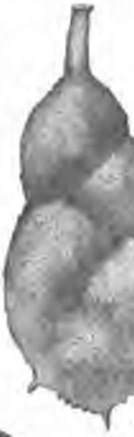

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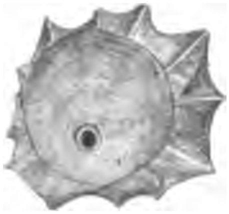
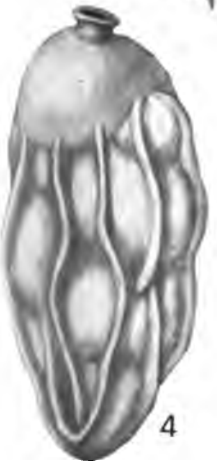


5*b*



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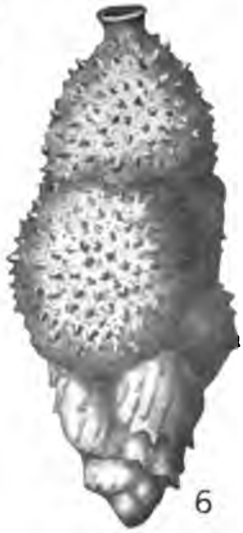

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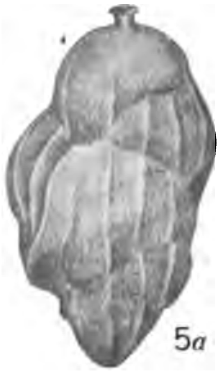
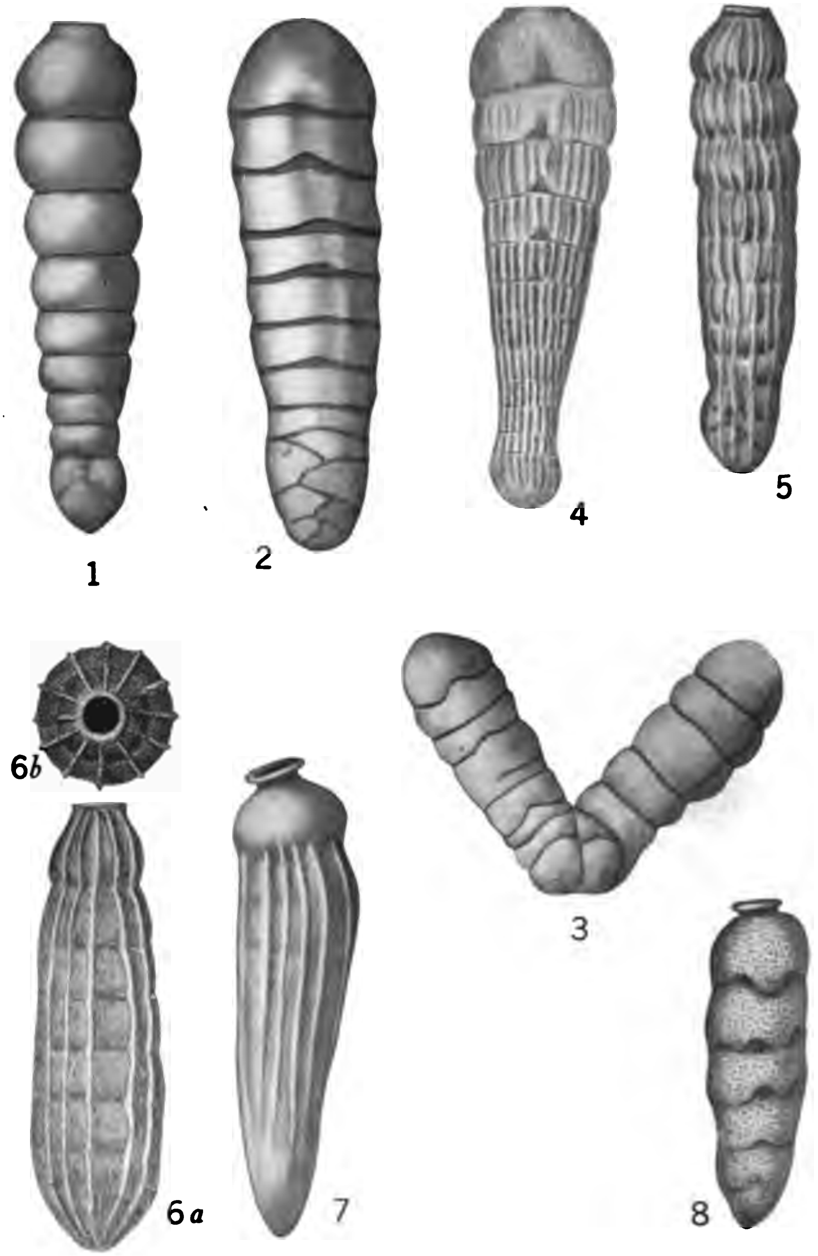


5*a*

**FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.**

FOR EXPLANATION OF PLATE SEE PAGE 544.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

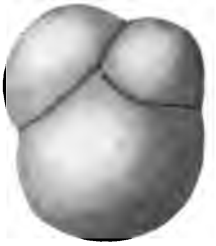
FOR EXPLANATION OF PLATE SEE PAGE 546.

## PLATE 56.

FIG. 1. *Siphogenerina columellaris*. × 66.
2. *Siphogenerina bifrons*, twinned specimen. × 66.
3. *Siphogenerina bifrons*. × 66.
4. *Siphogenerina bifrons*, var. *striatula*. × 66.
5. *Siphogenerina striata*. × 66.
6. *Siphogenerina raphanus*, var. *costulata*. × 66. *a*, apertural view; *b*, front view.
7. *Siphogenerina raphanus*. × 66.
8. *Siphogenerina dimorpha*. × 66.

## PLATE 57.

FIG. 1. *Candeiana nitida*, var. *triloba*. × 26. D5191. *a–c*, three views.
2. *Cristellaria articulata* (?) × 26. *a*, side view; *b*, apertural view.
3. *Cristellaria articulata* (?). × 26, with broad cristellarian base.
4. *Cristellaria articulata* (?). × 46. D5110. Very elongate, irregular specimen.
5. *Chilostomella grandis*. × 20. D5449. *a*, front view; *b*, side view; *c*, apertural view.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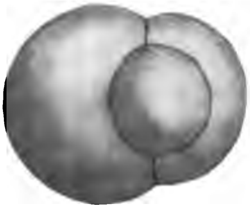
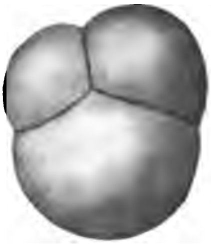
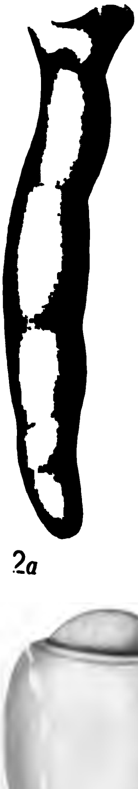
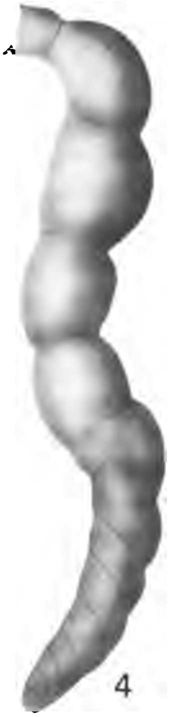

1*b*


1*c*


2*a*

2*b*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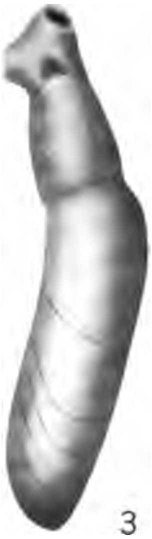
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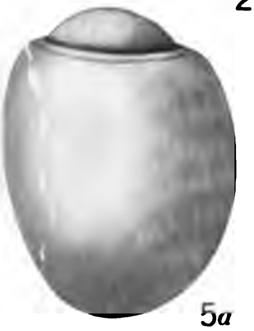
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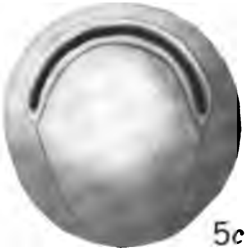
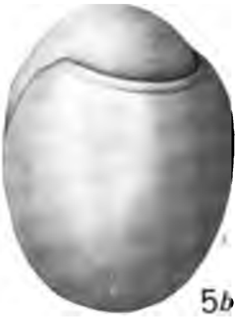
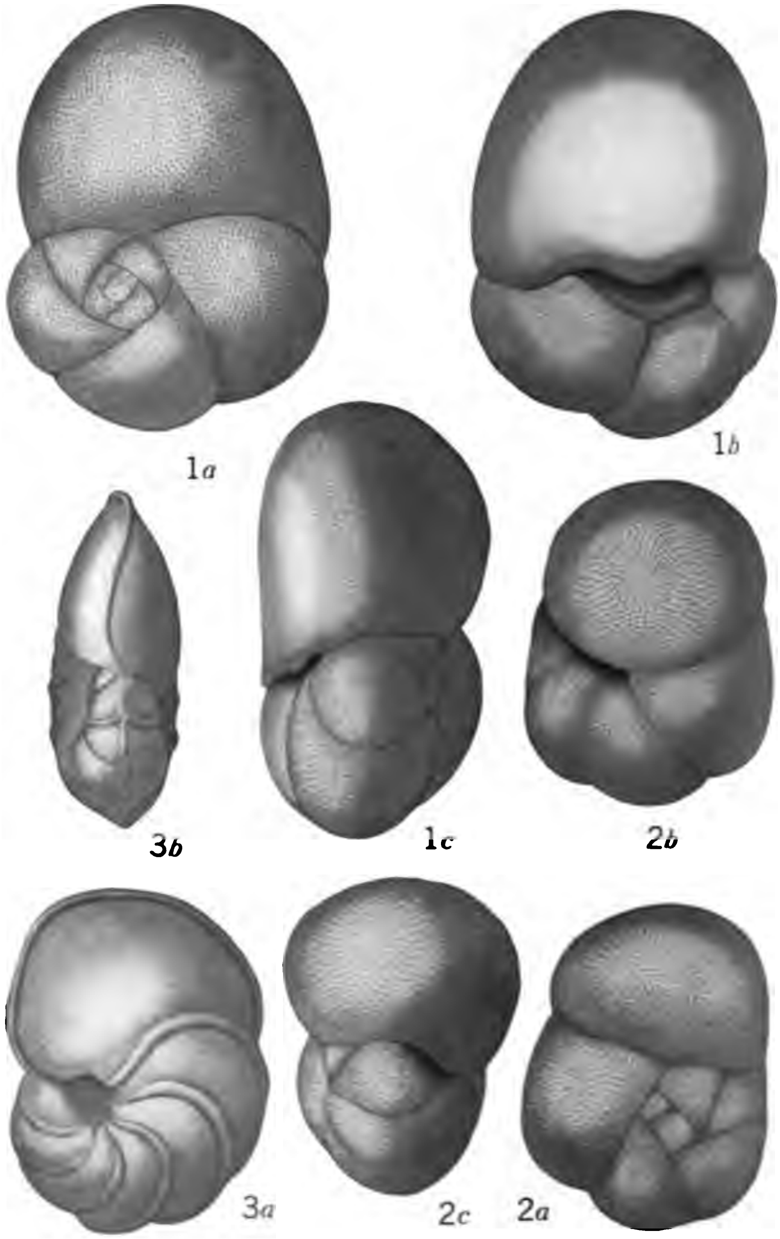

5*c*


5*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 546.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 847.

## PLATE 58.

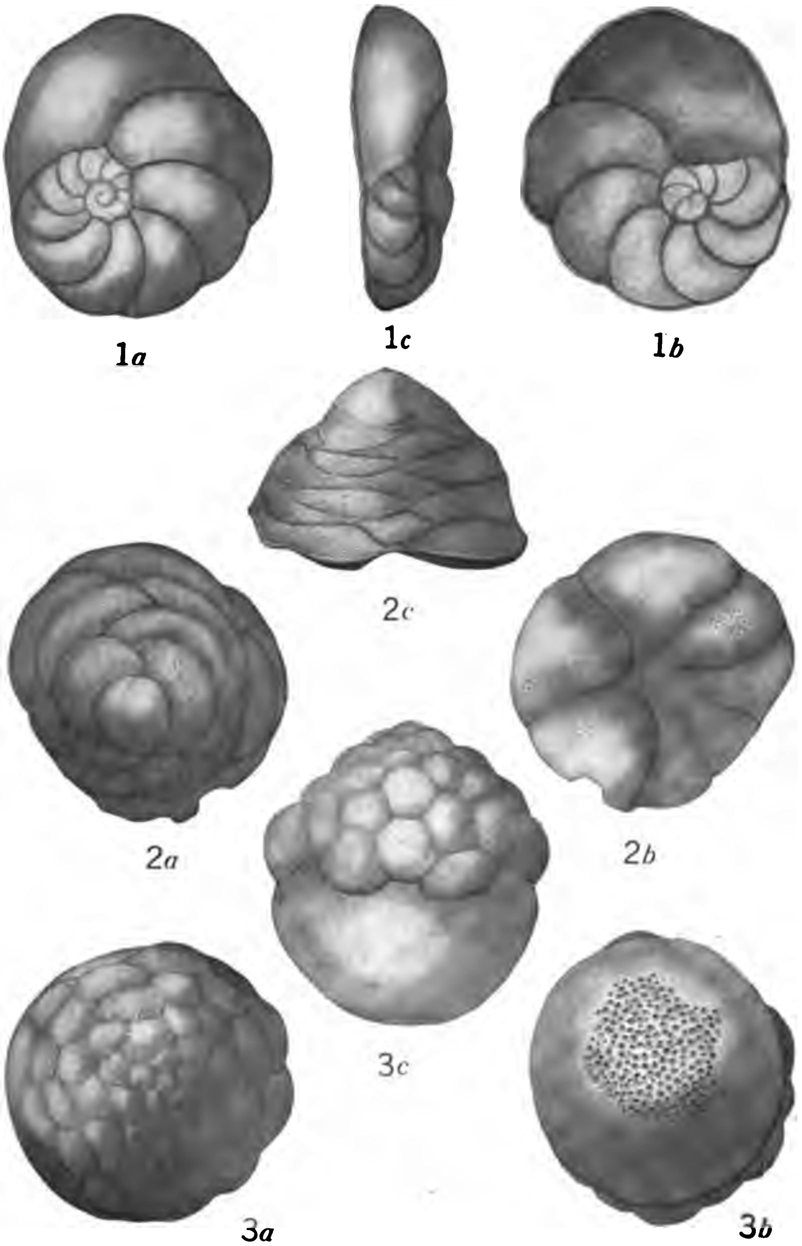
1. *Discorbis allomorphinoides.* × 66. D5261. *a*, dorsal view; *b*, ventral view; *c*, side view.
2. *Pulvinulina philippinensis.* × 66. *a*, dorsal view; *b*, ventral view; *c*, side view.
3. *Pulvinulina scabra.* × 66. D5220. *a*, ventral view; *b*, side view.

## PLATE 59.

FIG. 1. *Discorbis bertheloti.* × 25. D5268. *a*, dorsal view; *b*, ventral view; *c*, side view.

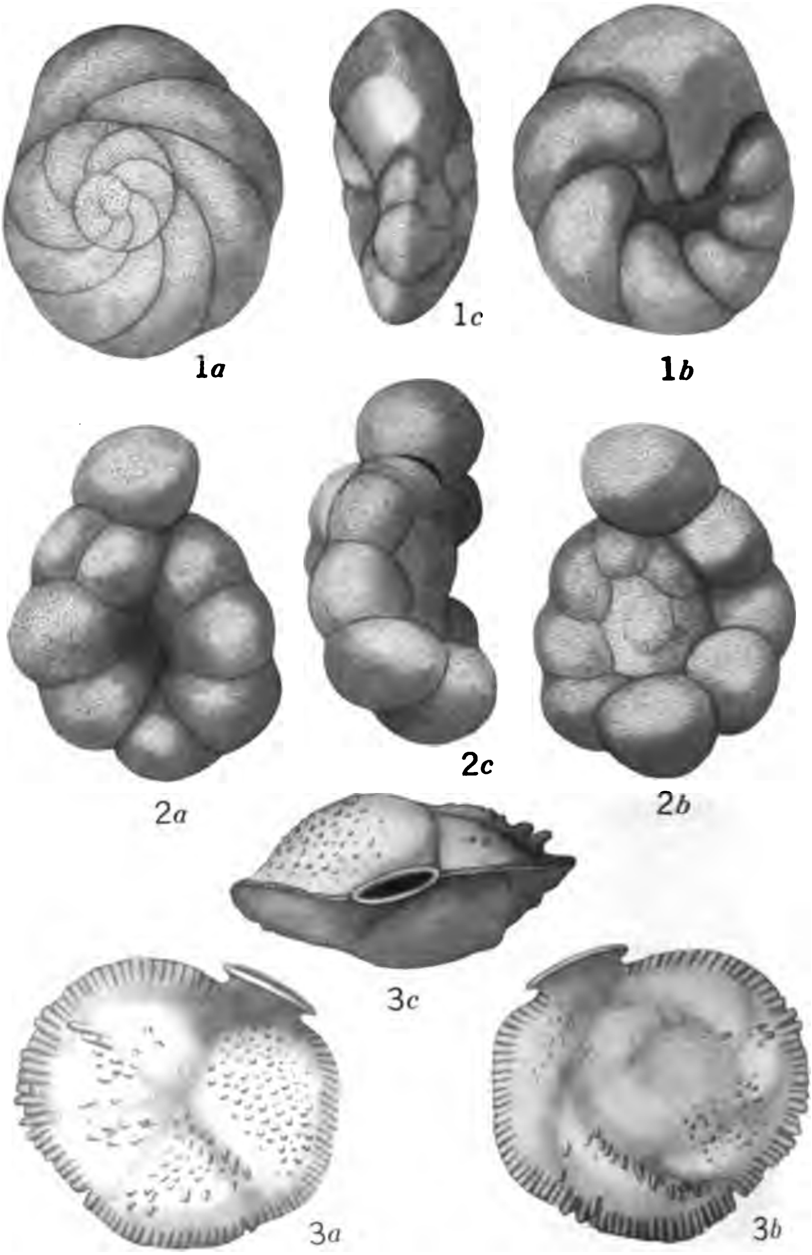
2. *Cymbalopora poeyi.* × 50. D5469. *a*, dorsal view; *b*, ventral view; *c*, side view.

3. *Tretomphalus bulloides.* ×50. D5576. *a*, dorsal view; *b*, ventral view; *c*, side view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 548.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 549.

## PLATE 60.

FIG. 1. *Discorbis*, species. × 70. D5201. *a*, dorsal view; *b*, ventral view; *c*, side view.

2. *Discorbis rugosa*. × 35. D5236. *a*, dorsal view; *b*, ventral view; *c*, side view.

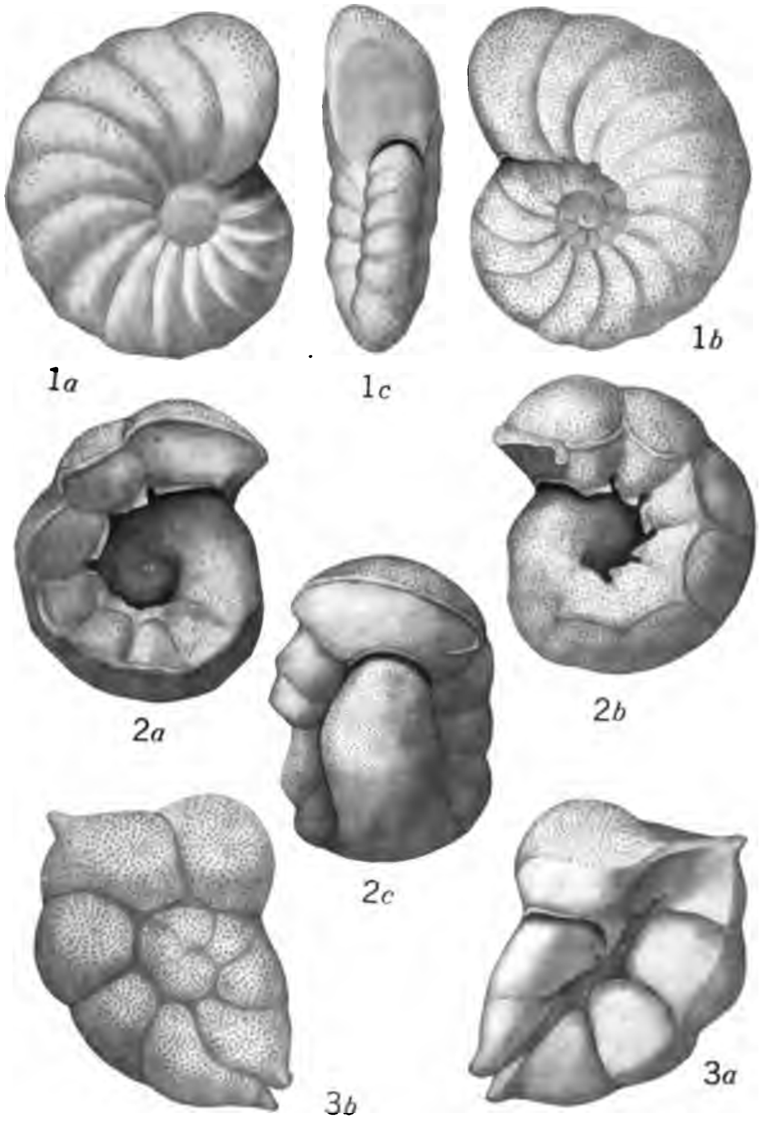
3. *Siphonina reticulata*. × 70. D5178. *a*, dorsal view; *b*, ventral view; *c*, side view.

## Plate 61.

FIG. 1. *Anomalina ammonoides.* × 66. 5259. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

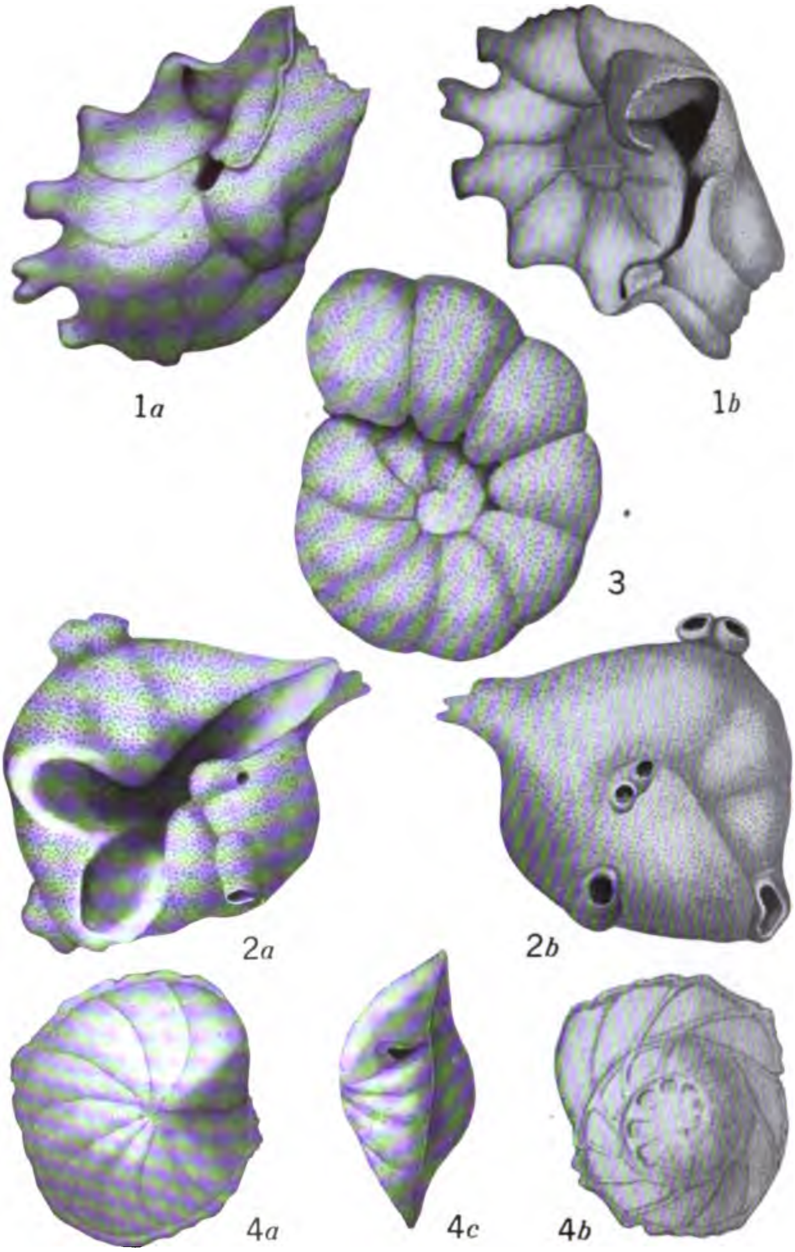
2. *Anomalina coronata.* × 33. D5236. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Anomalina polymorpha.* × 33. D5318. *a*, ventral view; *b*, dorsal view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 580.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 551.

## PLATE 62.

FIG. 1. *Anomalina polymorpha*, var. *cervicornis*. × 33. D5236. *a*, ventral view *b*, dorsal view.

2. *Anomalina polymorpha*, var. *siphonifera*. × 33. D5236. *a*, ventral view *b*, dorsal view.

3. *Anomalina grosserugosa*. × 33. D5236.

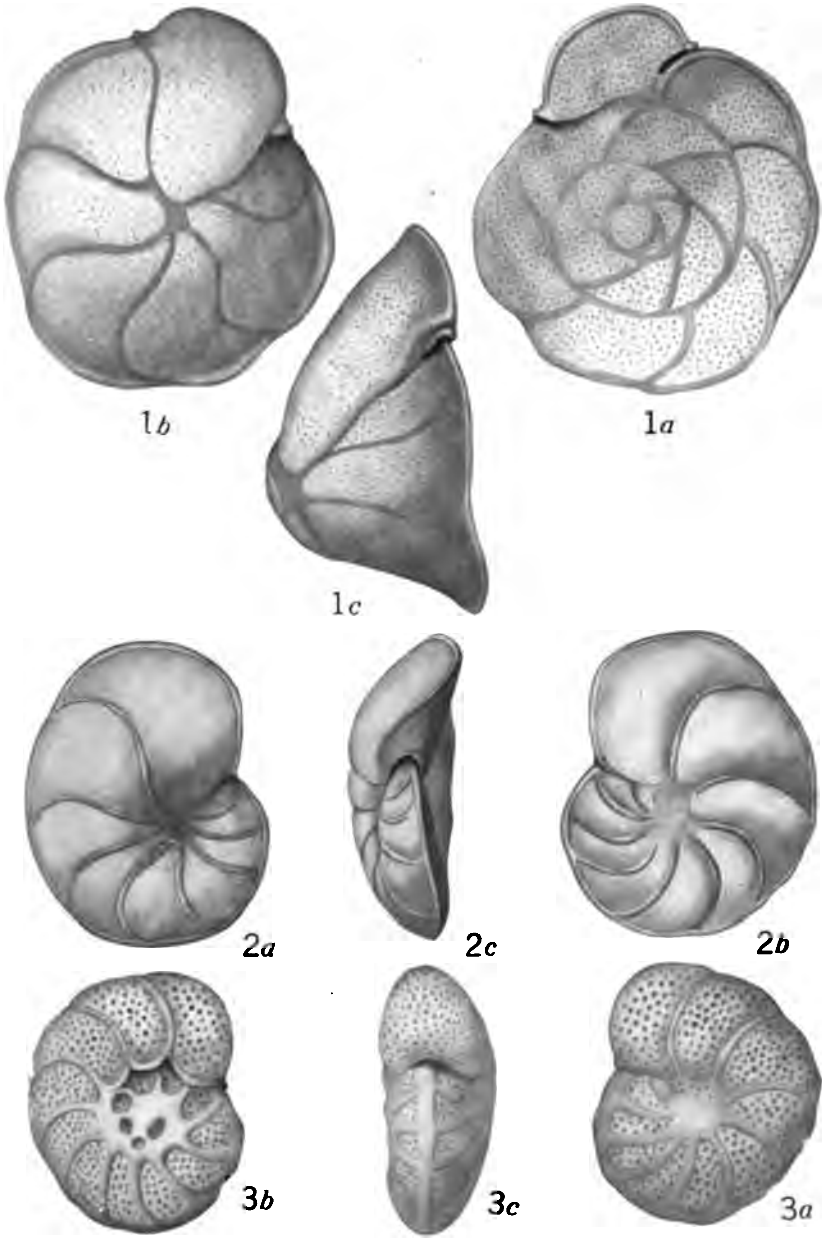
4. *Truncatulina culter*. × 66. D5635. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

## PLATE 63.

FIG. 1. *Truncatulina refulgens*. × 66. D5469. *a*, ventral view; *b*, dorsal view *c*, apertural view.

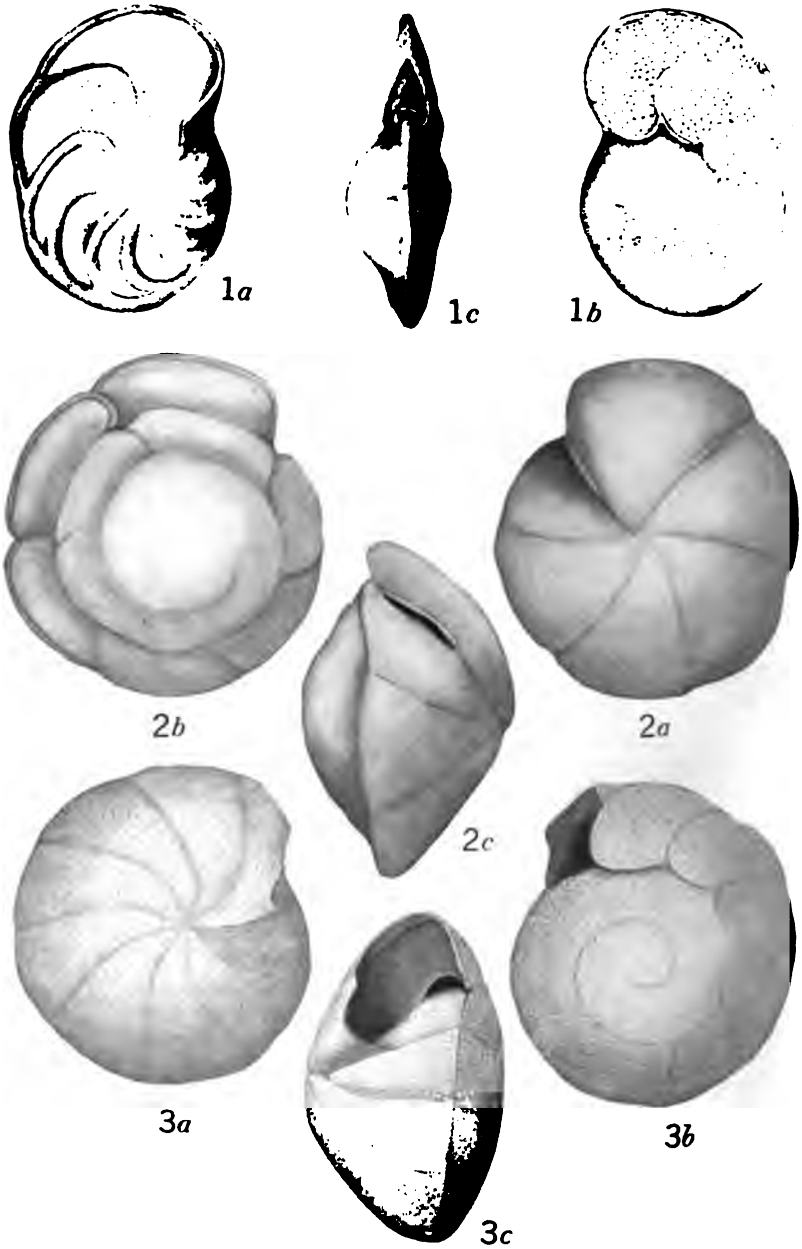
2. *Truncatulina lobatula*. × 66. D5590. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Truncatulina akneriana*. × 66. D5445. *a*, ventral view; *b*, dorsal view; *c*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 562.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 553.

## PLATE 64.

FIG. 1. *Truncatulina wuellerstorfi.* × 33. D5445. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

2. *Truncatulina tenera.* × 66. D5613. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

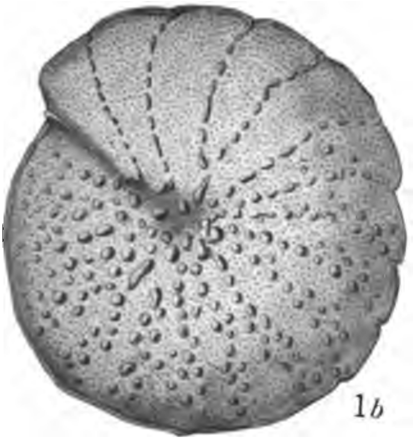
3. *Truncatulina haidingerii.* × 66. D5580. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

## PLATE 65.

FIG. 1. *Truncatulina margaritifera.* × 33. D5338. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

2. *Truncatulina variabilis.* × 33. D5546.

3. *Truncatulina ungeriana.* × 33. D5640. *a*, ventral view; *b*, dorsal view; *c*, apertural view.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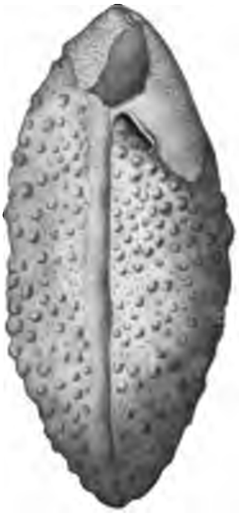
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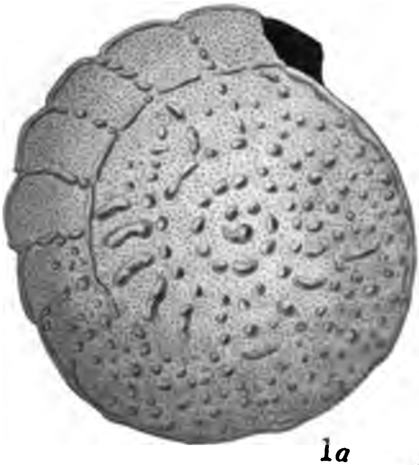
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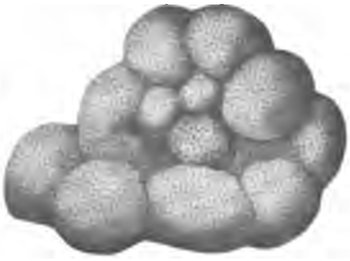
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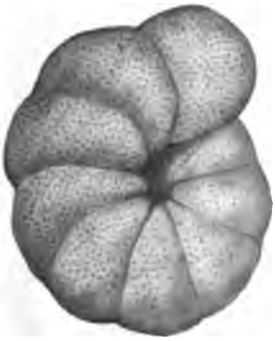
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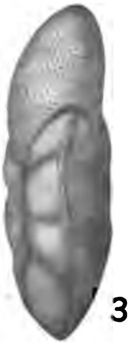
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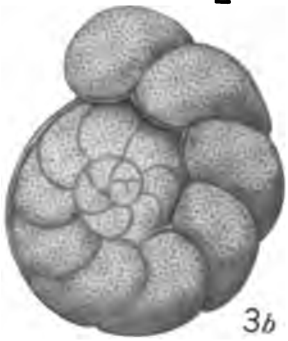
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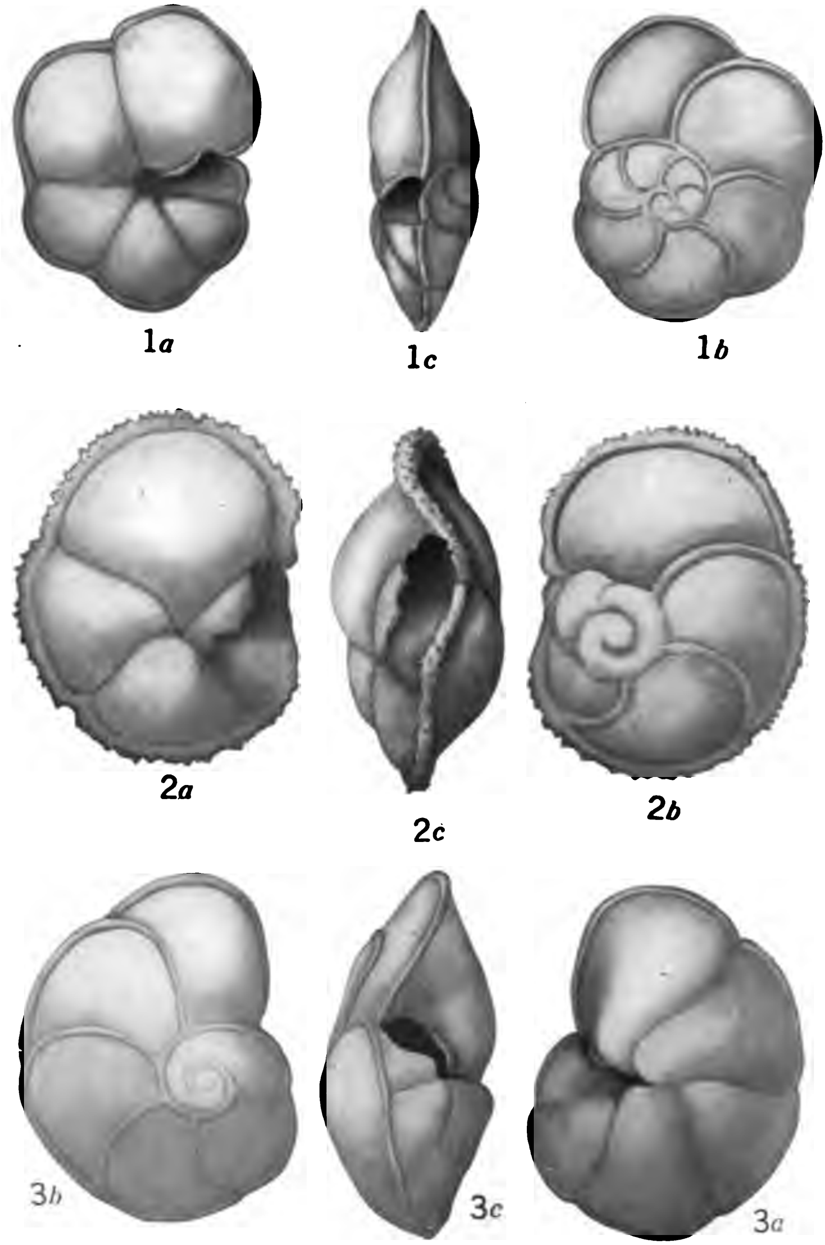
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 554.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 555.

## PLATE 66.

FIG. 1. ***Pulvinulina** menardii.* × 33. D5571. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

2. ***Pulvinulina** menardii*, var. *fimbriata.* × 66. D5638. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

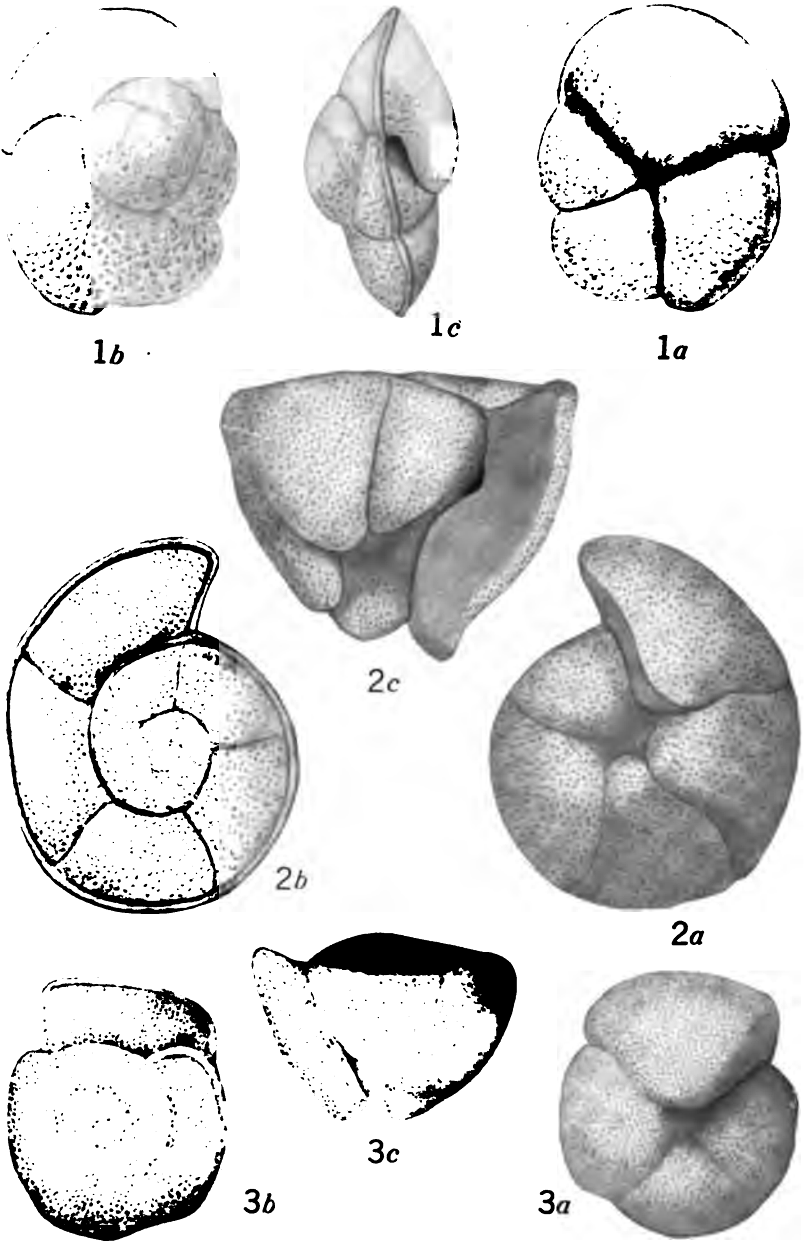
3. ***Pulvinulina** tumida.* × 33. D5637. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

## PLATE 67.

FIG. 1. *Pulvinulina canariensis.* × 66. D5606. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

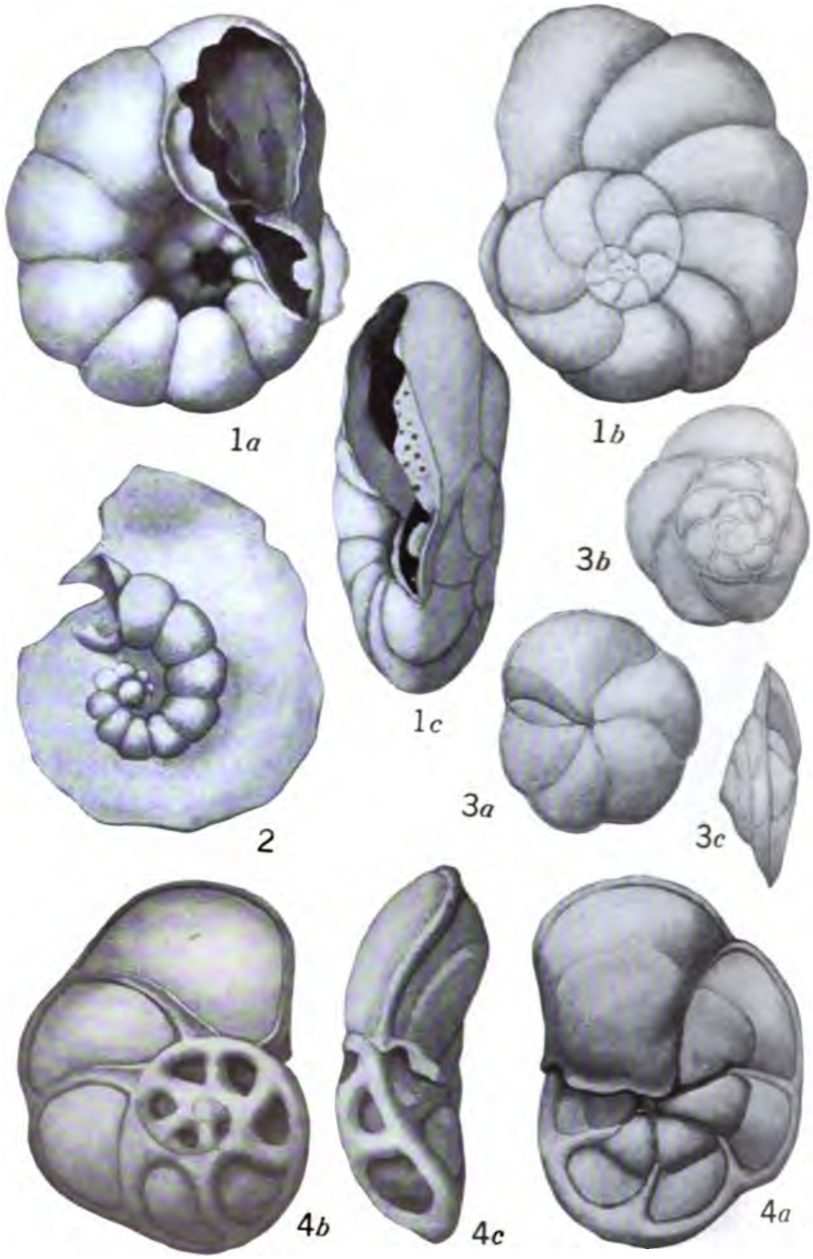
2. *Pulvinulina truncatulinoides.* × 66. D5300. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Pulvinulina crassa.* × 66. D5580. *a*, ventral view; *b*, dorsal view; *c*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 556.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 587.

## PLATE 68.

FIG. 1. *Pulvinulina punctulata*. × 33. D5642. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

2. *Pulvinulina pauperata*. × 22. D5439.

3. *Pulvinulina exigua*. × 66. D5439. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

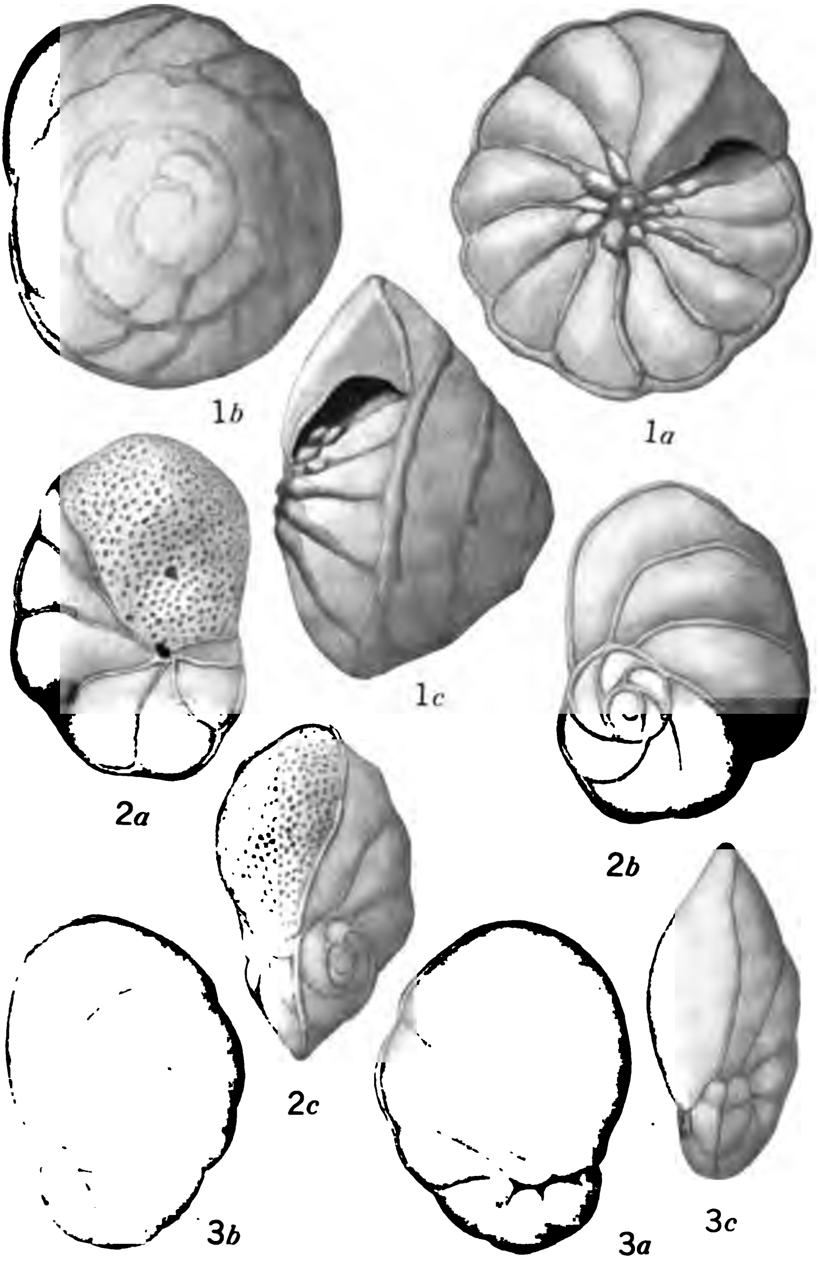
4. *Pulvinulina concentrica*. × 66. D5572. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

## PLATE 69.

FIG. 1. *Pulvinulina procera.* × 33. D5580. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

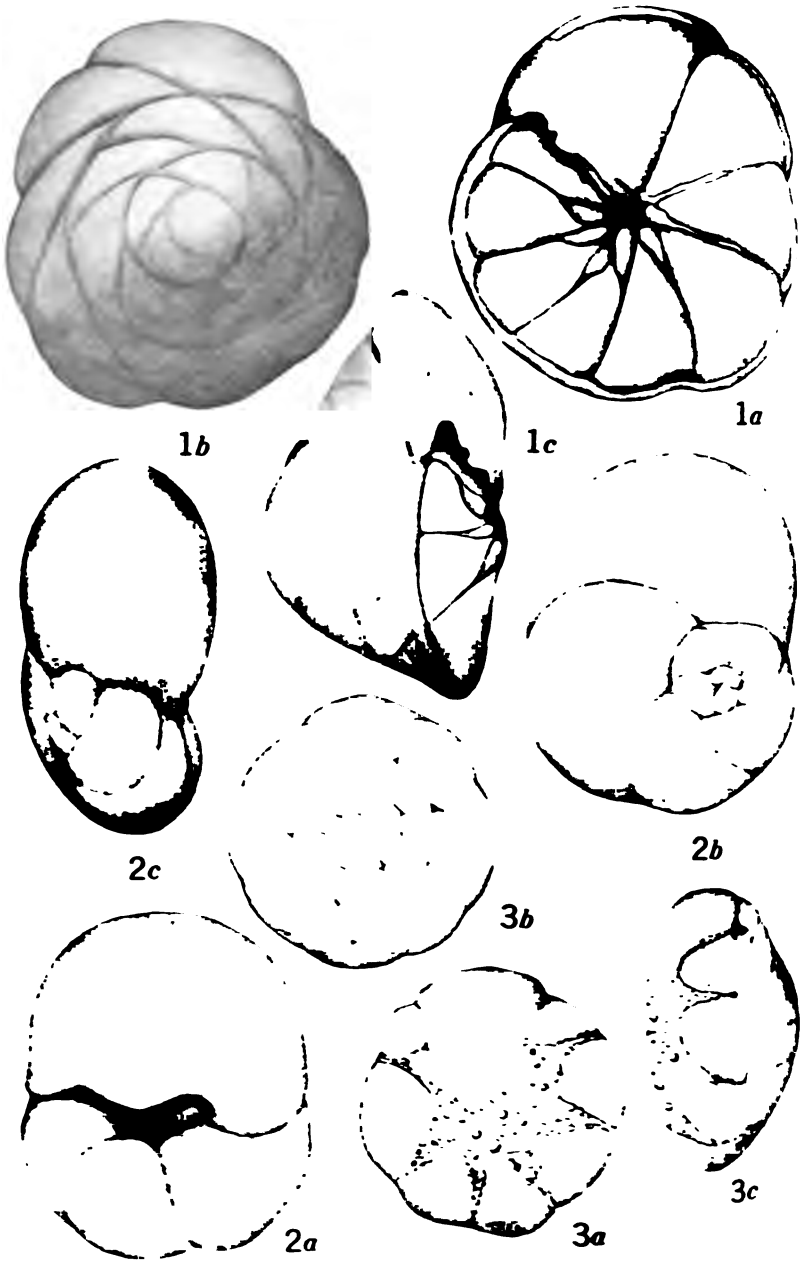
2. *Pulvinulina lateralis.* × 33. D5580. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Pulvinulina auricula.* × 66. D5465. *a*, ventral view; *b*, dorsal view; *c*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 558.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE [illegible].

## PLATE 70.

FIG. 1. ***Pulvinulina berthelotiana*, var. *subornata*.** × 33. D5301. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

2. ***Discorbis subobtusa*.** × 66. D5381. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

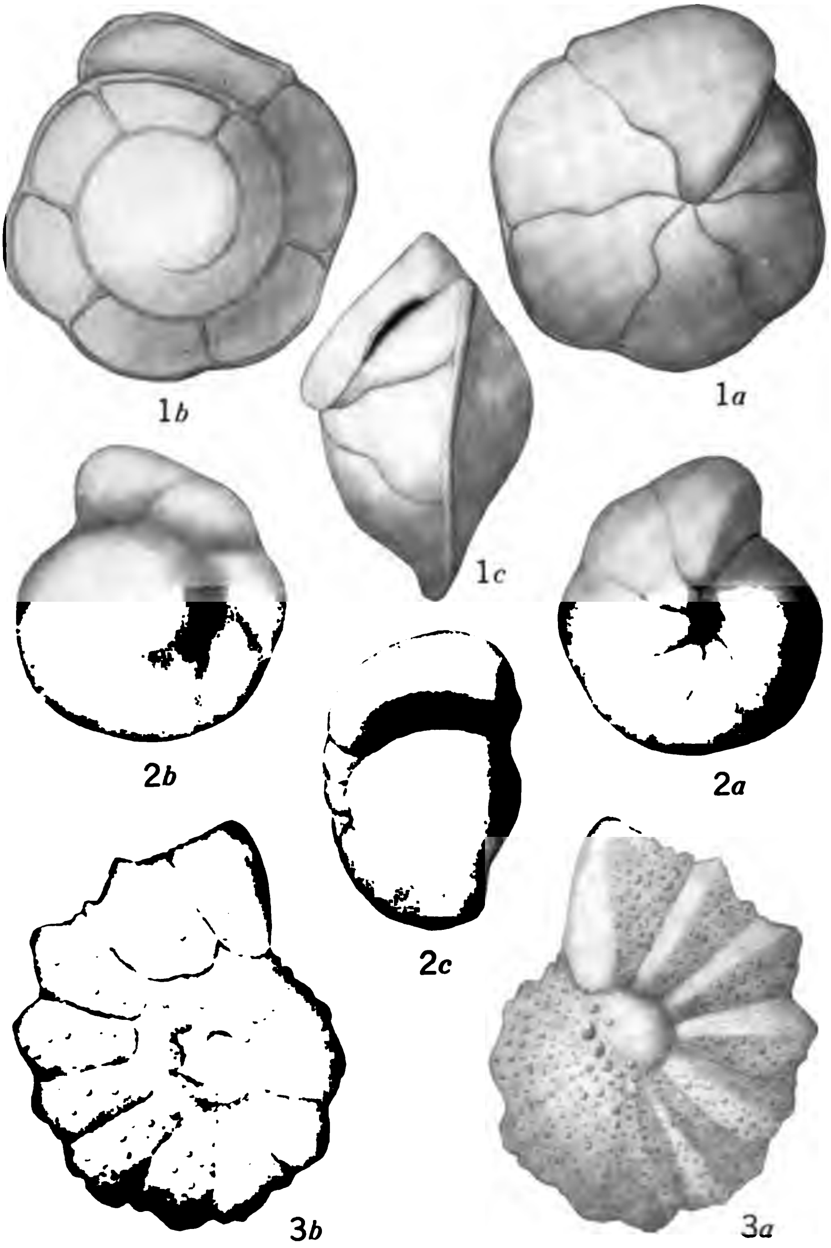
3. ***Rotalia beccarii*.** × 66. D5469. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

## Plate 71.

Fig. 1. *Pulvinulina umbonata.* × 66. D5468. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

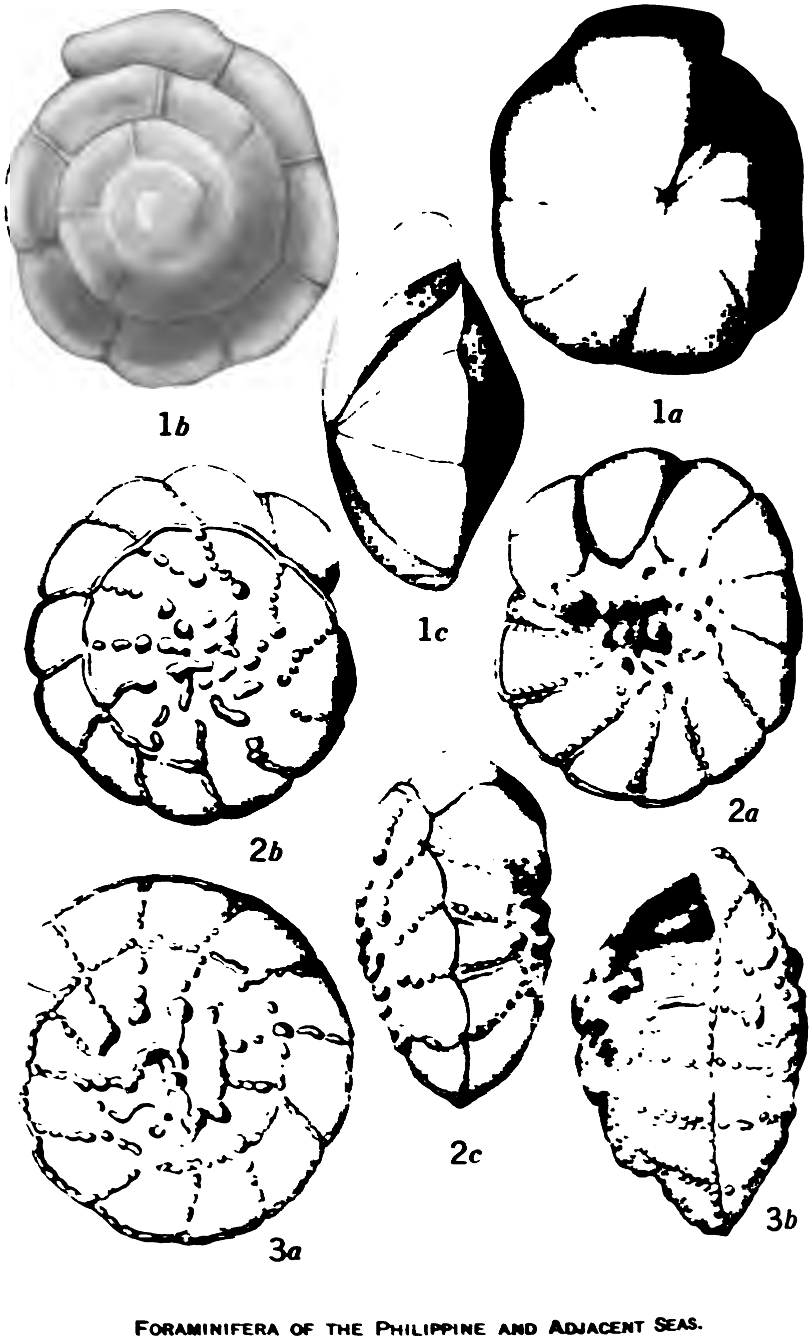
2. *Rotalia soldanii.* × 33. D5639. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Rotalia calcar.* × 50. D5630. *a*, ventral view; *b*, dorsal view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 560.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 561

## PLATE 72.

FIG. 1. *Rotalia broeckhiana.* × 50. D5637. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

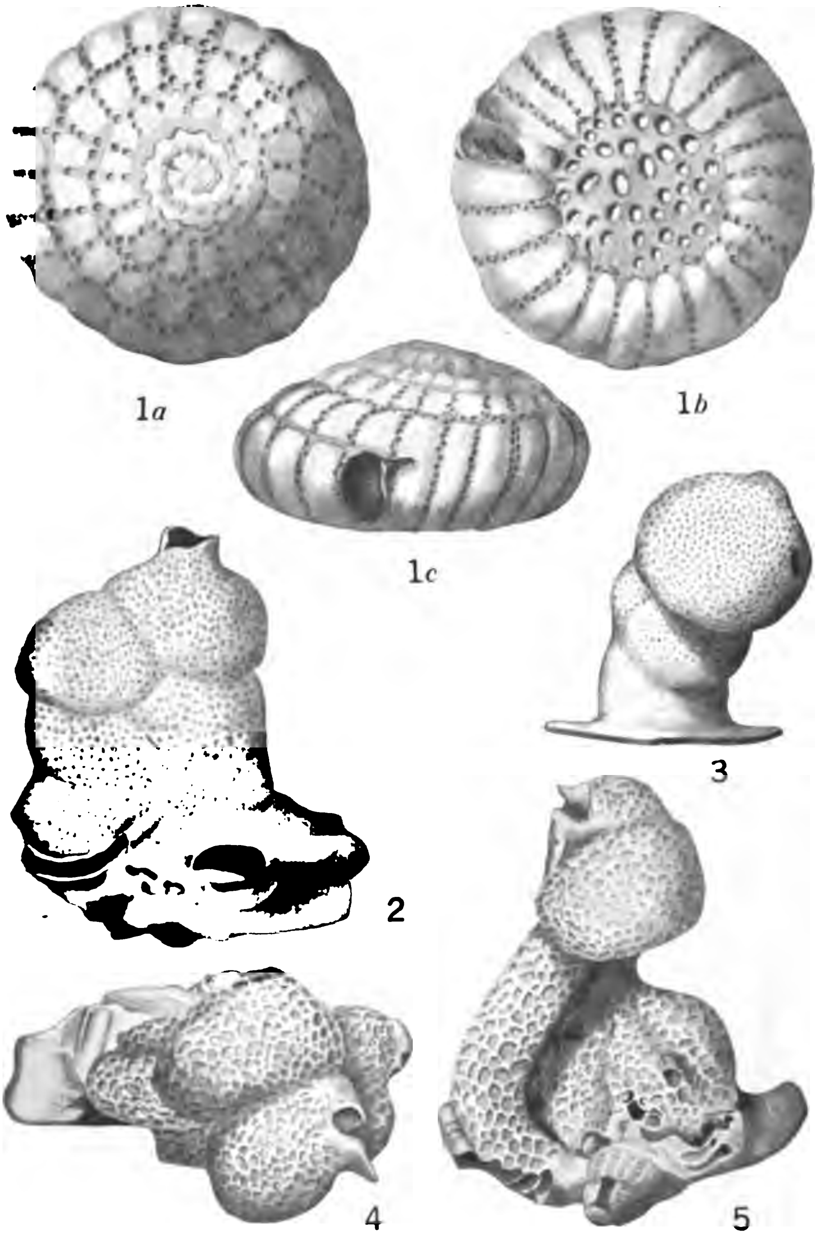
2. *Rotalia papillosa,* var. *compressiuscula.* × 33. *a*, ventral view; *b*, dorsal view; *c*, apertural view.

3. *Rotalia papillosa.* × 33. *a*, dorsal view; *b*, apertural view.

## PLATE 73.

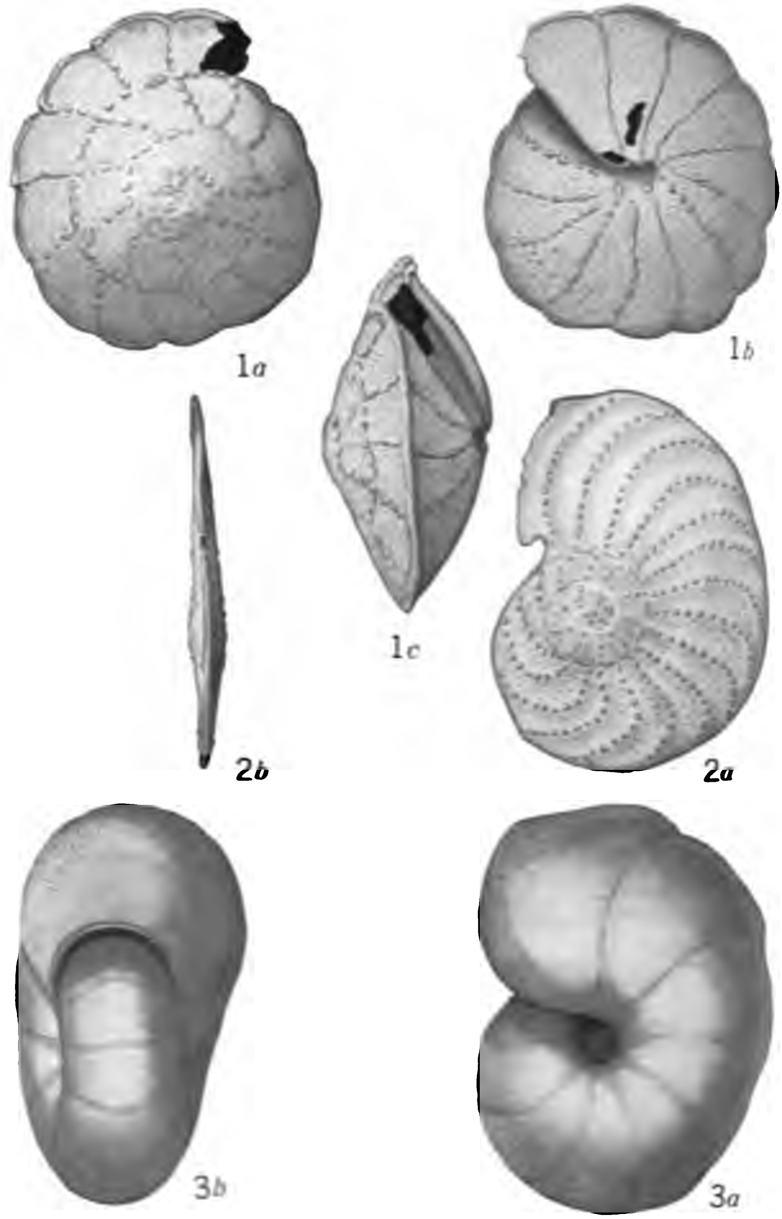
FIG. 1. *Rotalia schroeteriana.* × 12. D5338. *a*, dorsal view; *b*, ventral view; *c*, side view.

2. *Carpenteria proteiformis.* × 15.
3. *Carpenteria proteiformis.* × 15.
4. *Carpenteria utricularis.* × 15.
5. *Carpenteria utricularis.* × 15.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 562.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

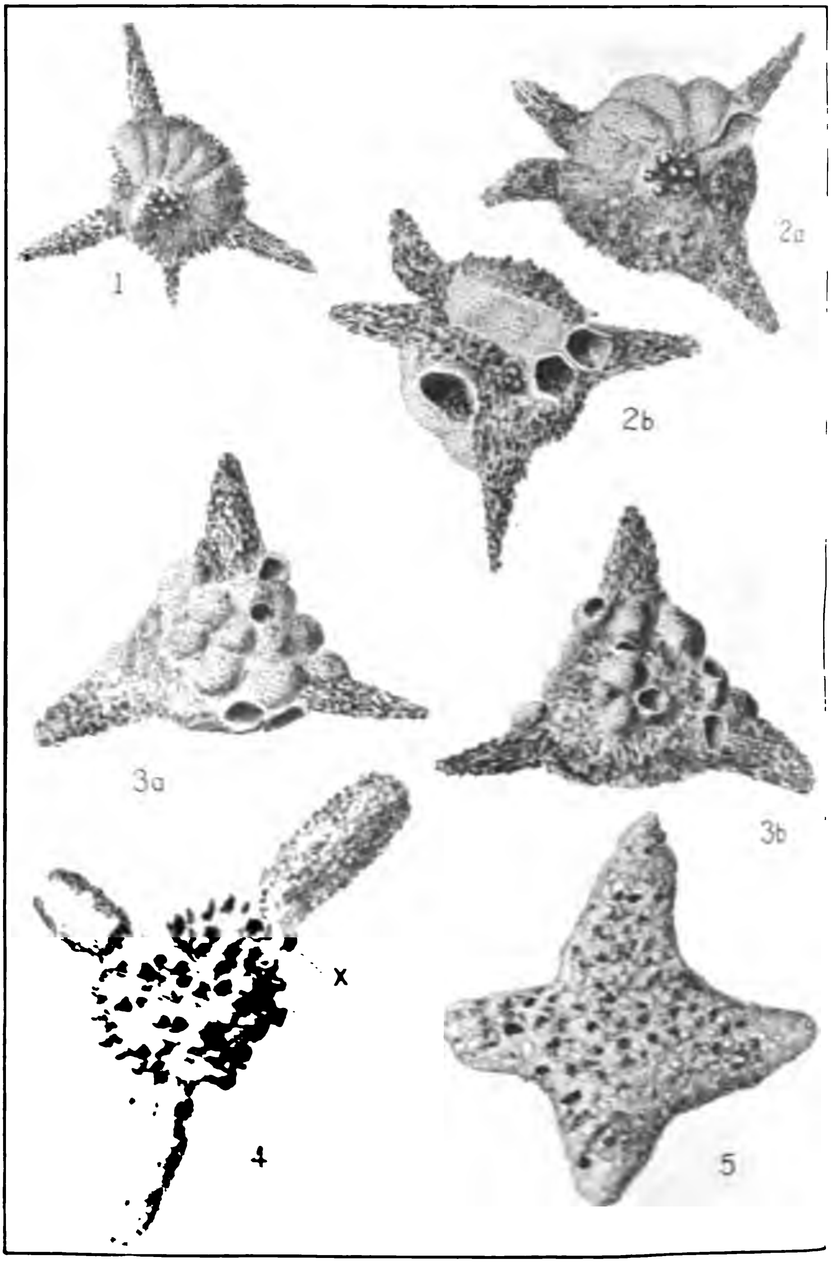
FOR EXPLANATION OF PLATE SEE PAGE 563.

## PLATE 74.

FIG. 1. *Truncatulina margaritifera.* × 23. *a*, dorsal view; *b*, ventral view; *c*, apertural view.

2. *Operculina bartschi*, var. *ornata.* × 10. *a*, side view; *b*, apertural view.

3. *Nonionina umbilicatula.* × 65. D5236. *a*, side view; *b*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE [illegible]

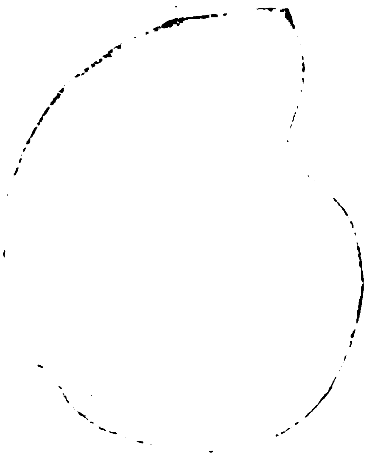
## PLATE 76.

FIGS. 1–5. *Siderolites tetraedra.*

1. Young, ventral view. × 45.
2. Later stage, chambers invading dorsal side. × 40. *a*, ventral side; *b*, dorsal side.
3. Still later stage where dorsal side is partly covered by the invading chambers. × 35. *a*, ventral view; *b*, dorsal view.
4. Old eroded specimen, in which the chambers are largely broken away, leaving the raised bosses ($x$) as projections from the center. × 18.
5. Specimens in which the chambers now cover even the spines. × 15.

## PLATE 77.

FIG. 1. *Cornuspira foliacea.* × 20. D5424.
2. *Cornuspira foliacea,* var. *expansa.* × 20. D5259.
3. *Cornuspira involvens.* × 20. D5198.
4. *Cornuspira involvens.* × 20. D5256.
5. *Cornuspira involvens,* var. *striatula.* × 30. D5282.
6. *Cornuspira carinata.* × 20. D5523.



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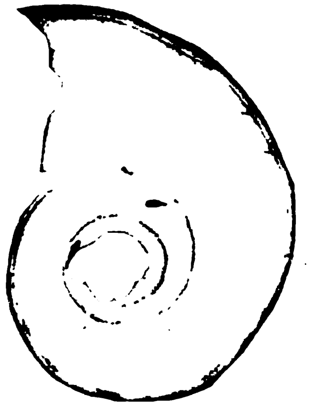

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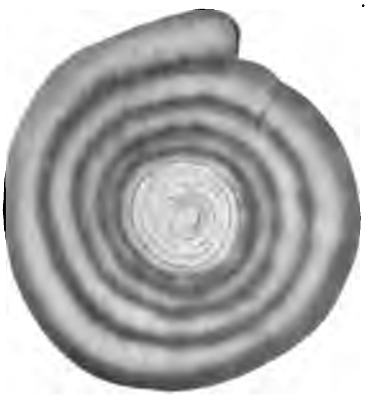

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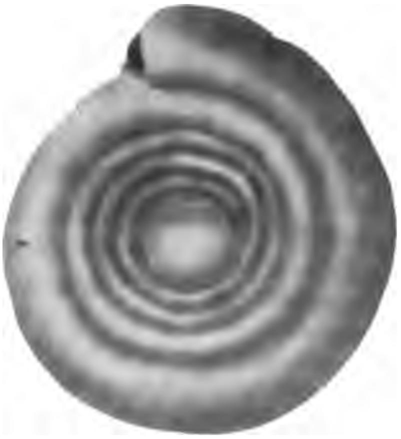

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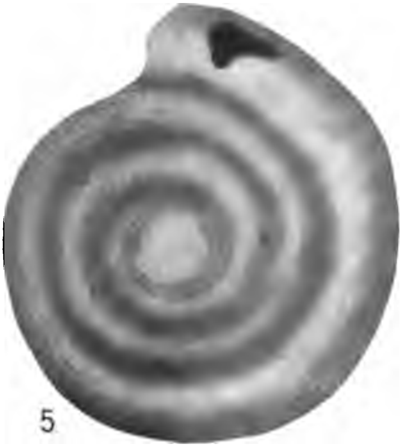

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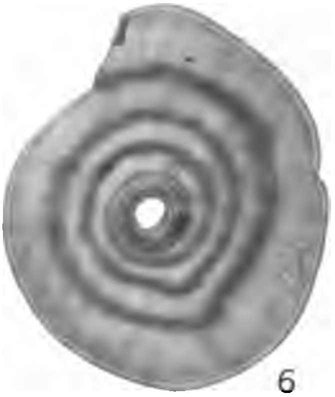
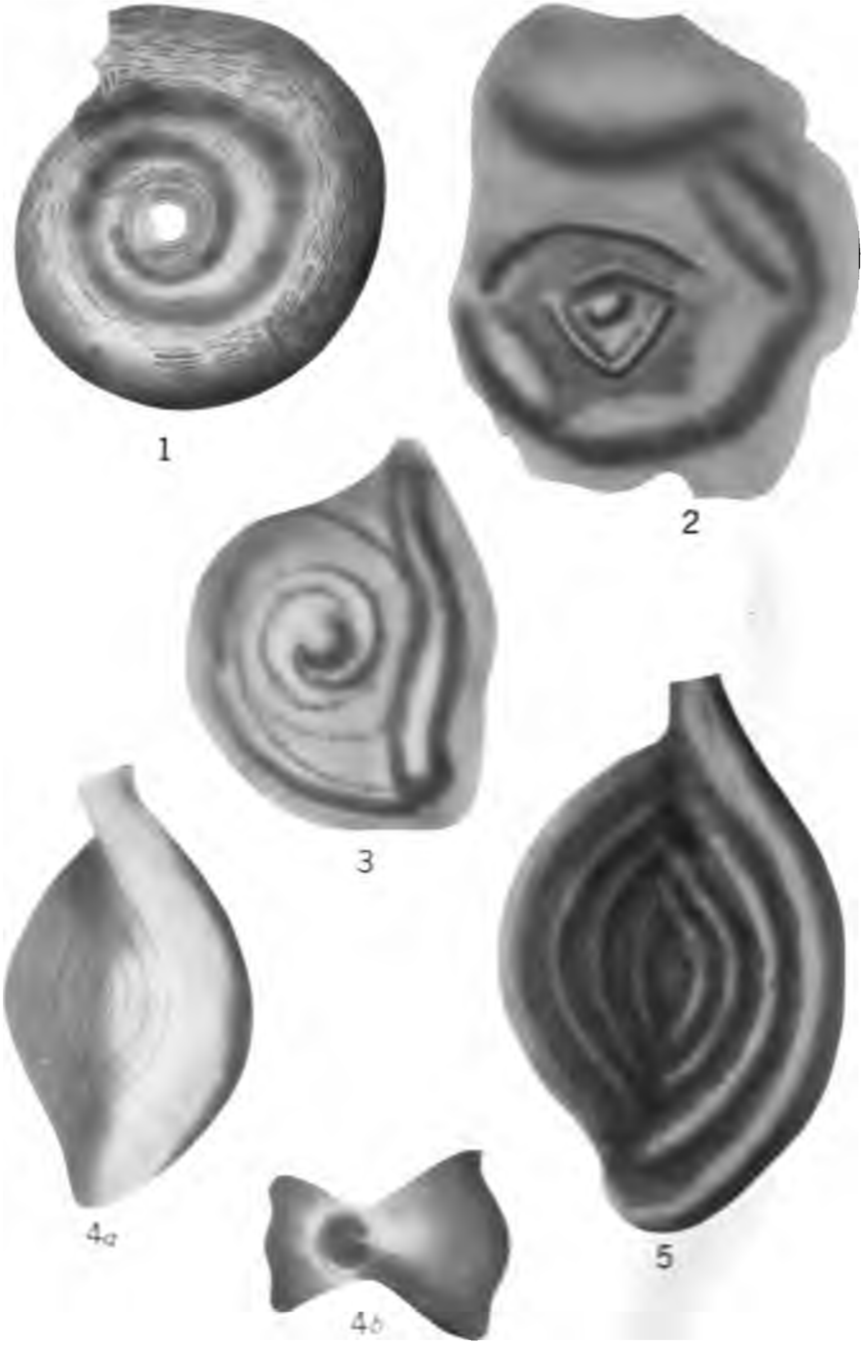


6

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 566.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

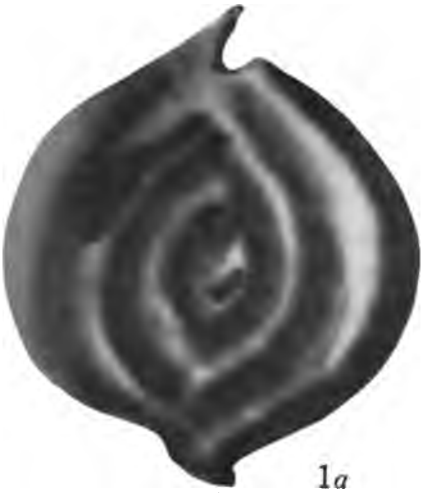
FOR EXPLANATION OF PLATE SEE PAGE [illegible]

## PLATE 78.

FIG. 1. *Cornuspira lacunosa.* × 20. D5259.
2. *Opthalmidium inconstans.* × 20. Adult.
3. *Opthalmidium inconstans.* × 50. Young.
4. *Spiroloculina grateloupi.* × 20. D5179. *a*, front view; *b*, apertural view.
5. *Spiroloculina grateloupi*, var. *incisa.* × 20. D5369.

## PLATE 79.

FIG. 1. *Spiroloculina costifera.* × 18. D5236. *a*, front view; *b*, apertural view.
2. *Spiroloculina robusta.* × 18. D5650. *a*, front view; *b*, apertural view.
3. *Spiroloculina validus.* × 18. D5668. *a*, front view; *b*, apertural view.



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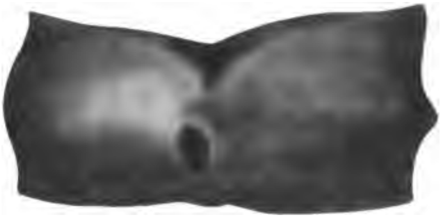
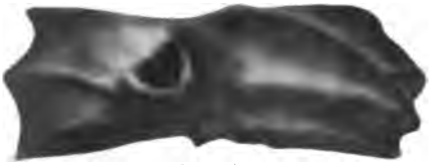


2*b*



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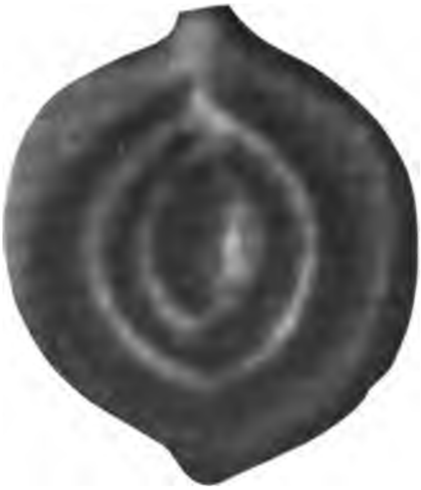

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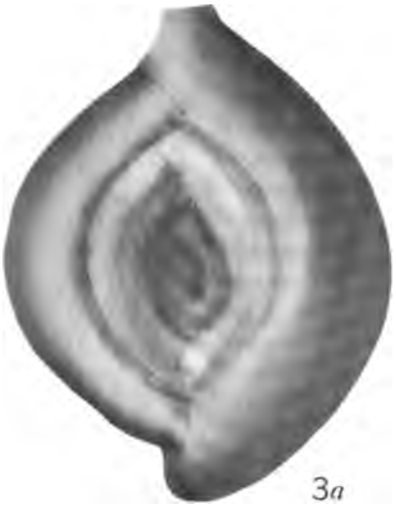

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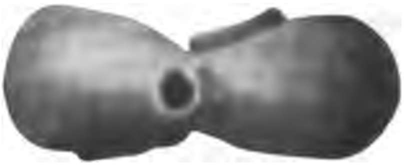
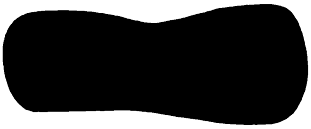


3*b*

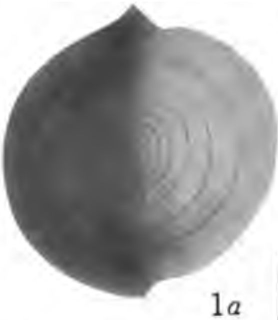
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 568.



1*b*

3*b*



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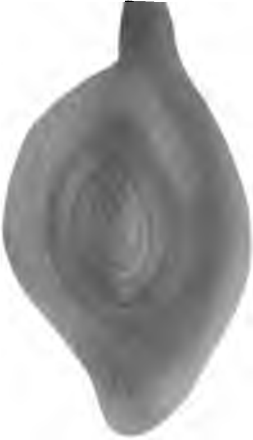

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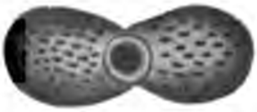

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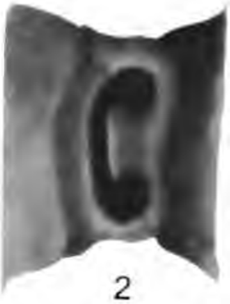

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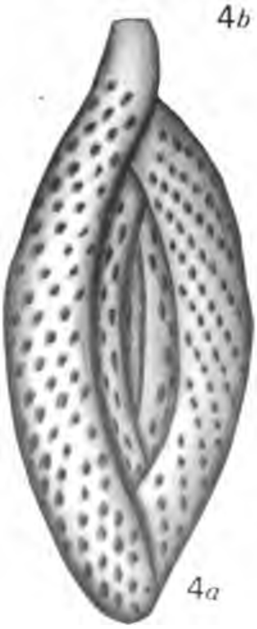
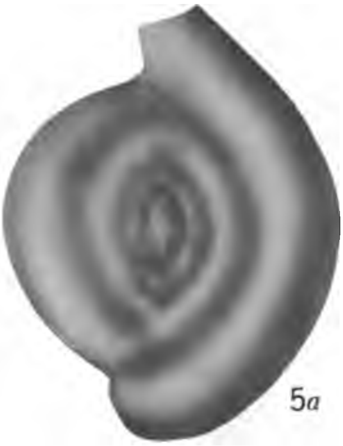


4*a*

5*b*



5*a*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

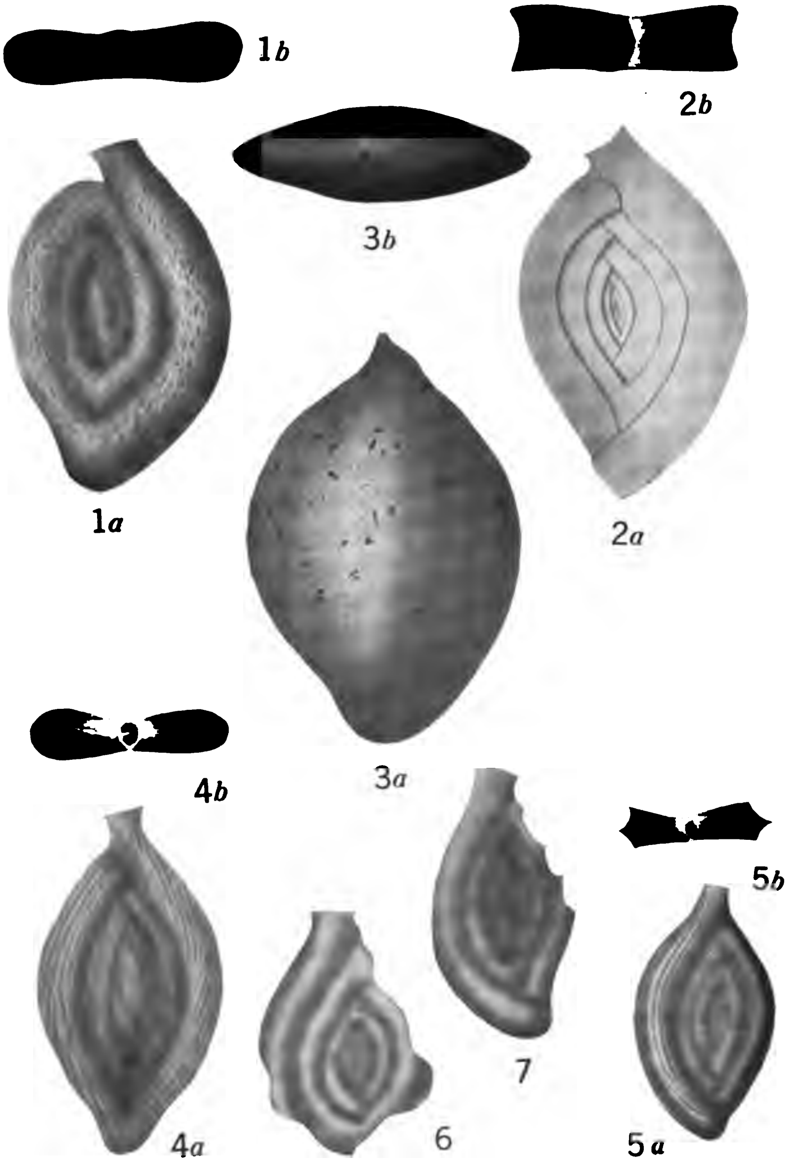
FOR EXPLANATION OF PLATE SEE PAGE 589.

## PLATE 80.

FIG. 1. *Spiroloculina circularis.* × 23. D5259. *a*, front view; *b*, apertural view.
2. *Spiroloculina circularis.* × 66. D5259. Aperture.
3. *Spiroloculina canaliculata.* × 23. D5268. *a*, front view; *b*, apertural view.
4. *Spiroloculina elegans.* × 23. D5143. *a*, front view; *b*, apertural view.
5. *Spiroloculina planissima.* × 66. D5342. *a*, front view; *b*, apertural view.

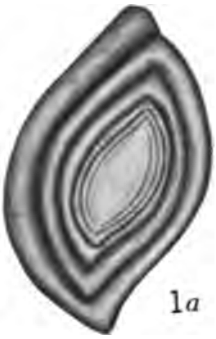
## PLATE 81.

FIG. 1. *Spiroloculina scrobiculata.* × 30. D5181. *a*, **front view; *b*, apertural view.**
2. *Spiroloculina depressa.* × 30. D5217. *a*, **front view; *b*, apertural view.**
3. *Spiroloculina arenaria.* × 30. D5110. *a*, **front view; *b*, apertural view.**
4. *Spiroloculina antillarum.* × 30. D5218. *a*, **front view; *b*, apertural view.**
5. *Spiroloculina antillarum*, **var.** *angulata.* × 30. D5218. *a*, **front view; *b*, apertural view.**
6, 7. *Spiroloculina millettii.* × 30. **Tacloban Anchorage.**



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 670.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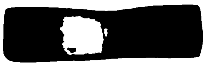
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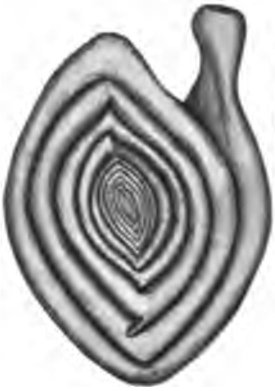
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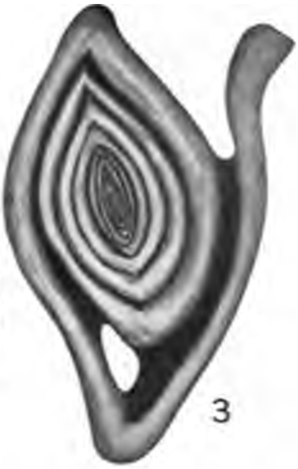
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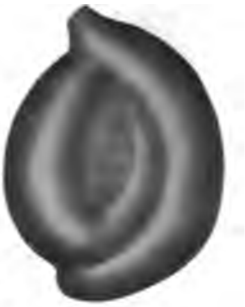
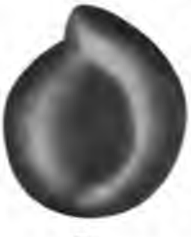

6

4*b*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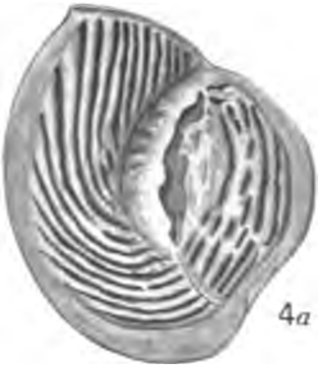
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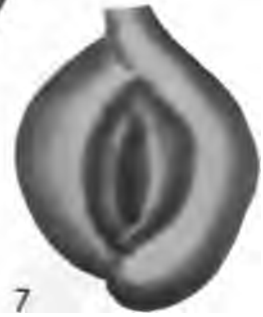

7

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 571

## PLATE 82.

FIG. 1. *Spiroloculina tenuiseptata.* × 27. D5238. *a*, face view; *b*, apertural view.
2. *Spiroloculina tenuiseptata.* × 21. D5236. Starting to uncoil.
3. *Spiroloculina tenuiseptata.* × 21. D5236. Later stage.
4. *Spiroloculina convexiuscula.* × 21. *a*, face view; *b*, apertural view.
5–7. *Spiroloculina costifera*, var. *plena*, new variety. × 18. D5236. Various stages in the development.

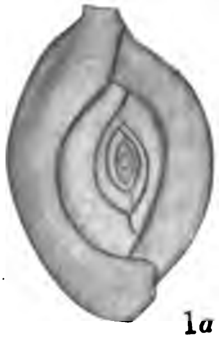
## Plate 83.

Fig. 1. *Spiroloculina advena.* × 30. D5178. ***a***, convex side: ***b***, concave side: ***c***, apertural view.

2. *Spiroloculina affixa.* × 48. D5192. ***a***, convex side: ***b***, concave side: ***c***, apertural view.

3. *Spiroloculina orbis.* × 30. D5178.

4. *Spiroloculina antillarum*, variety. × 30. D5218.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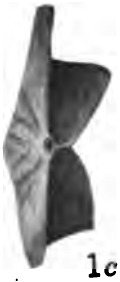
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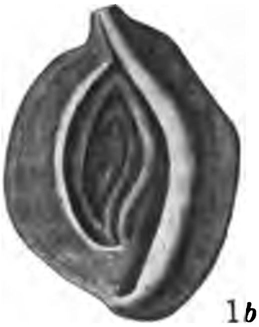
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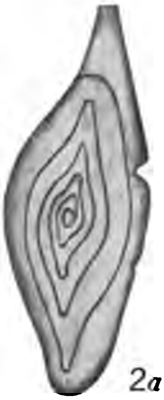
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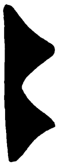
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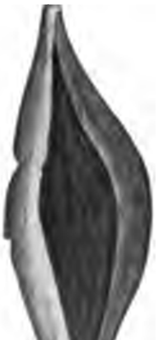
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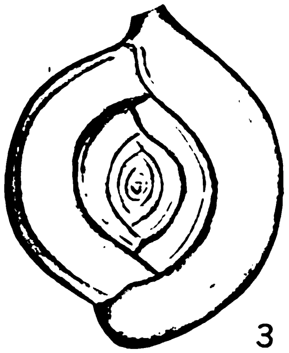
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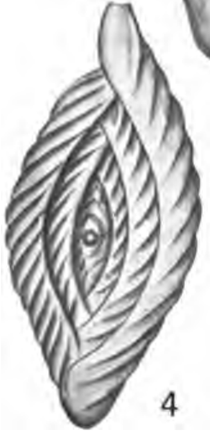
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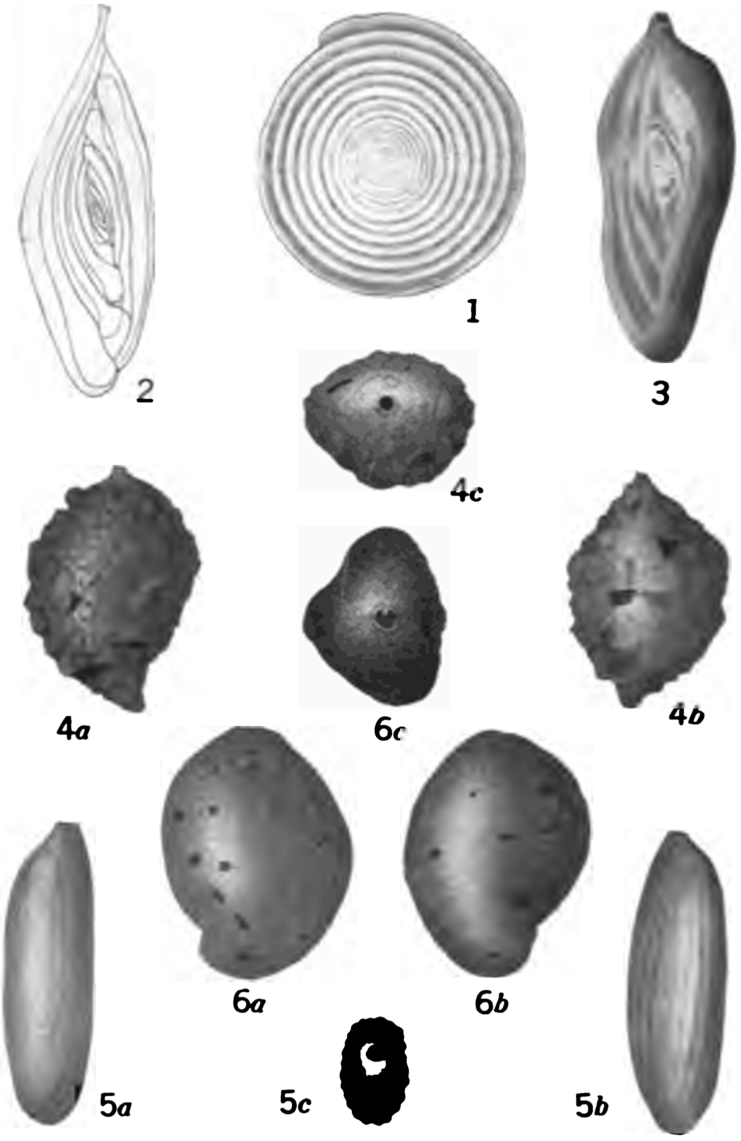
FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 672.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 573.

## PLATE 84.

FIG. 1. *Cornuspira crassisepta.* × 56.
2. *Spiroloculina tenuissima.* × 82. D5227.
3. *Spiroloculina tenuimargo.* × 82. D5349. Abnormal specimen.
4. *Quinqueloculina crassatina.* × 26. D5178. *a*, side view; *b*, reverse side; *c*, apertural view.
5. *Quinqueloculina recta.* × 26. D5570. *a*, side view; *b*, reverse side; *c*, apertural view.
6. *Quinqueloculina fusca.* × 26. Tara Island, Philippine Islands. *a*, side view; *b*, reverse side; *c*, apertural view.

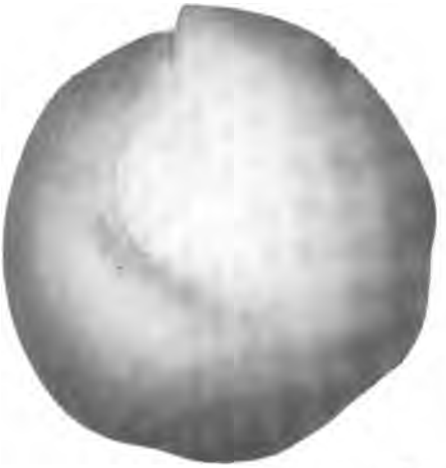
## PLATE 85.

FIG. 1. *Planispirina contraria.* × 23. D5582. *a*, side view; *b*, apertural view.

2. *Nodobacularia tibia.* × 23. Specimen with the proloculum broken open, showing interior.

3. *Nodobacularia tibia.* × 23. Exterior of another specimen.

4. *Quinqueloculina albatrossi.* × 23. D5133. *a*, side view; *b*, opposite side; *c*, apertural view.



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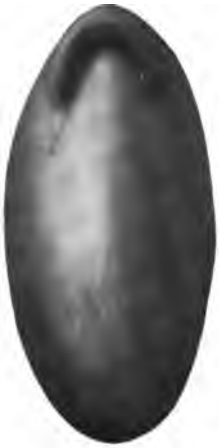

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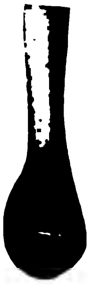

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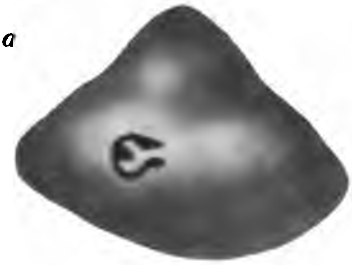
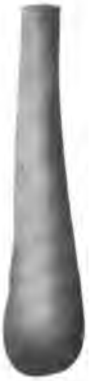


4*c*



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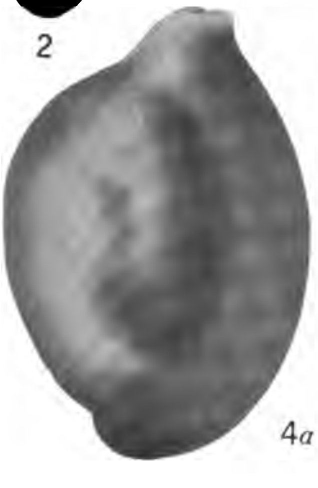

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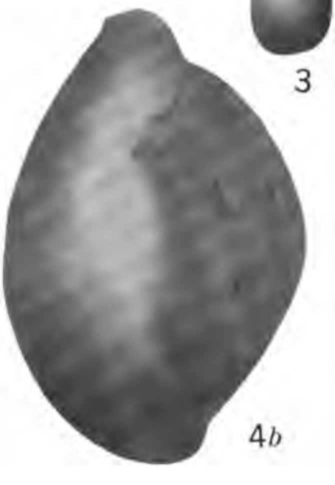
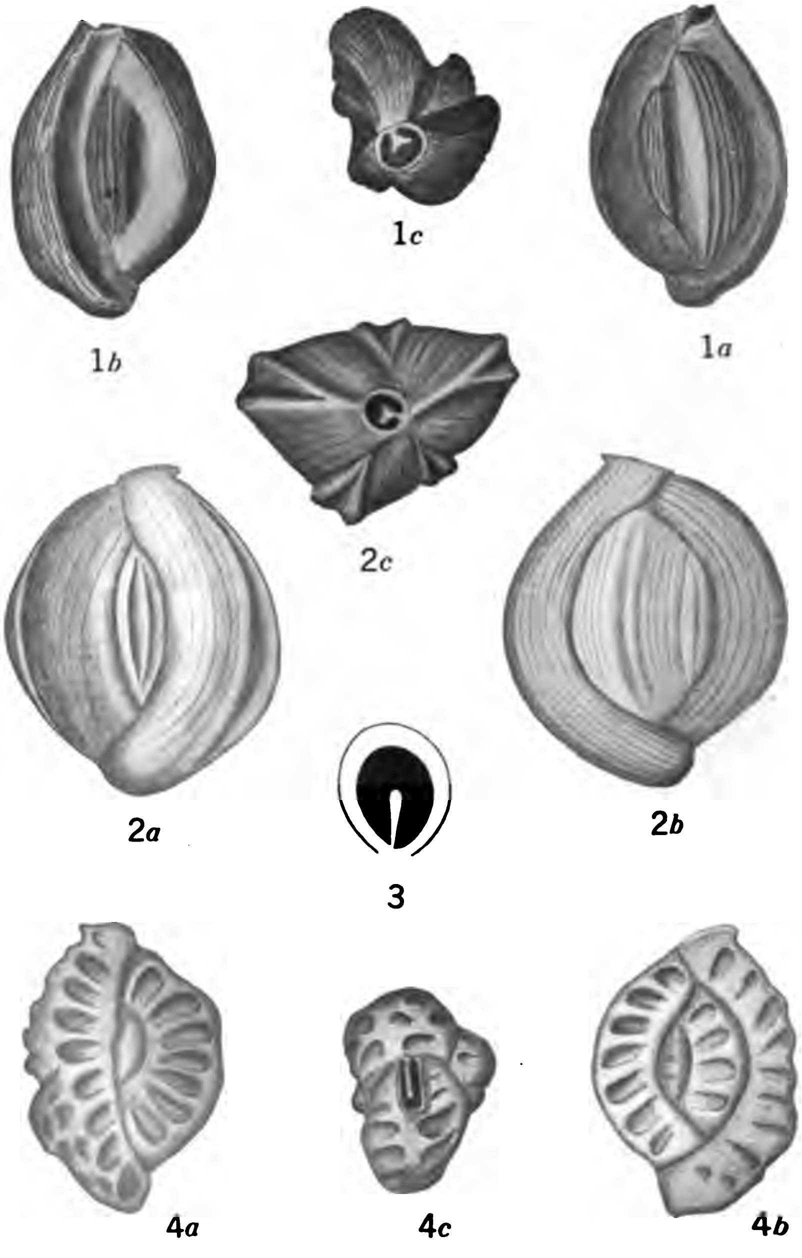


4*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 674.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 578.

## PLATE 86.

FIG. 1. *Quinqueloculina disparilis.* × 22. D5178. *a*, side view; *b*, reverse side; *c*, apertural view.

2. *Quinqueloculina bicarinata.* × 30. D5134. *a*, side view; *b*, reverse side; *c*, apertural view.

3. *Quinqueloculina bicarinata.* × 116. D5143. Aperture of early stage with simple tooth.

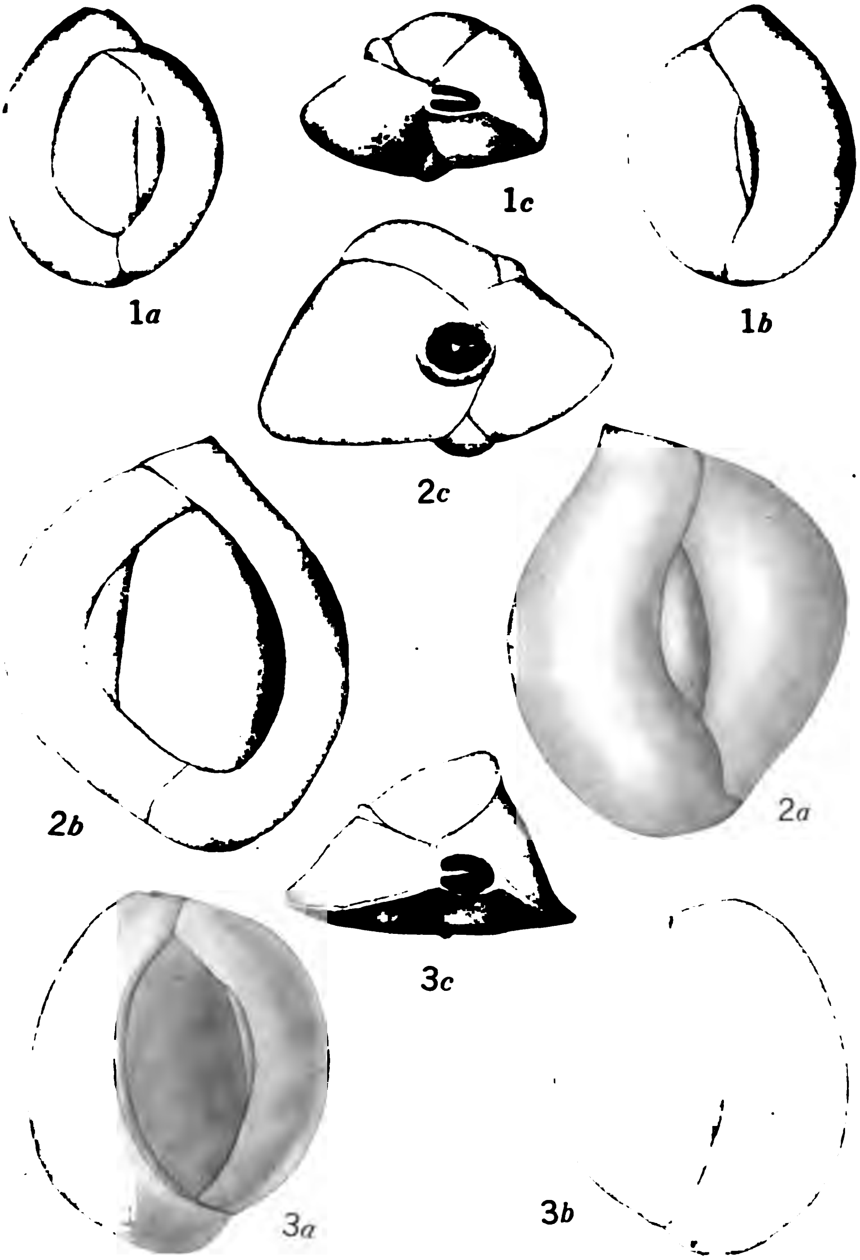
4. *Quinqueloculina parkeri.* × 30. D5160. *a*, side view; *b*, reverse side; *c*, apertural view.

## PLATE 87.

FIG. 1. *Quinqueloculina vulgaris.* × 23. D5227. *a*, side view; *b*, opposite side; *c*, apertural view.

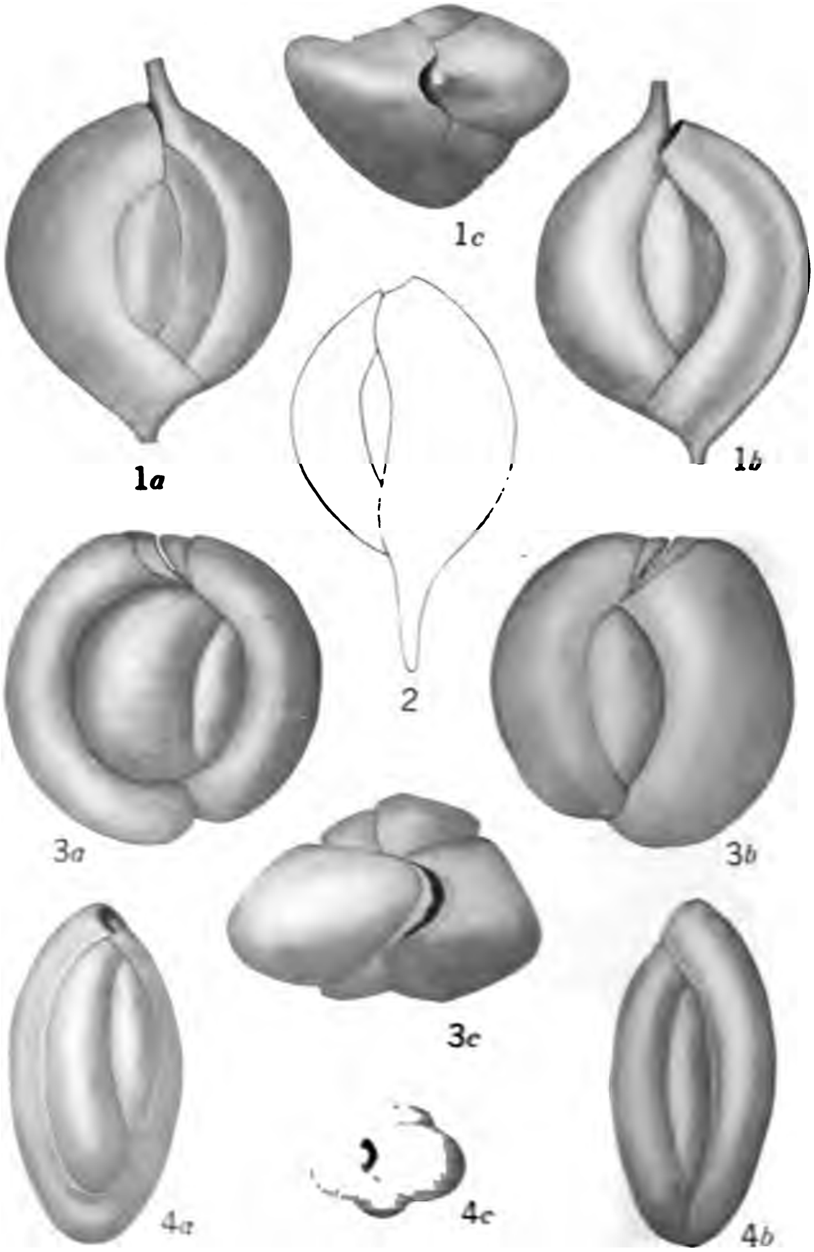
2. *Quinqueloculina lamarckiana.* × 23. D5201. *a*, side view; *b*, opposite side; *c*, apertural view.

3. *Quinqueloculina lamarckiana.* × 20. D5220. *a*, side view; *b*, opposite side; *c*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 576.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 577

## PLATE 88.

FIG. 1. *Quinqueloculina apicula.* × 18. D5236. *a*, side view; *b*, opposite side *c*, apertural view.

2. *Quinqueloculina apicula.* × 18. D5236. Outline of specimen with the spine greatly developed.

3. *Quinqueloculina procera.* × 12. D5236. *a*, side view; *b*, opposite side; *c*, apertural view.

4. *Quinqueloculina seminulum.* × 24. *a*, side view; *b*, opposite side; *c*, apertural view.

## PLATE 89.

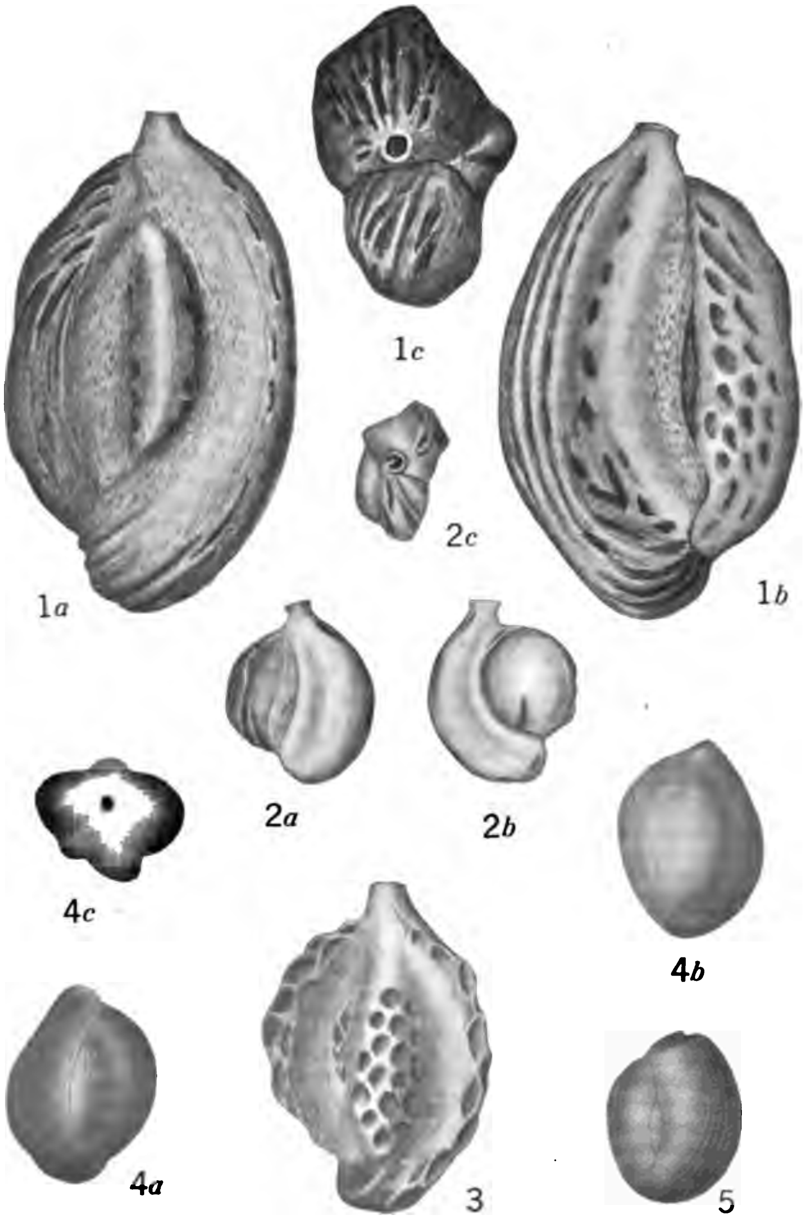
FIG. 1. *Quinqueloculina kerimbatica*, var. *reticulo-striata*. × 26. D5143. *a*, side view; *b*, reverse side; *c*, apertural view.

2. *Quinqueloculina kerimbatica*, var. *philippinensis*. × 26. D5192. Four-chambered stage. *a*, side view; *b*, reverse side; *c*, apertural view.

3. *Quinqueloculina kerimbatica*, var. *philippinensis*. × 26.

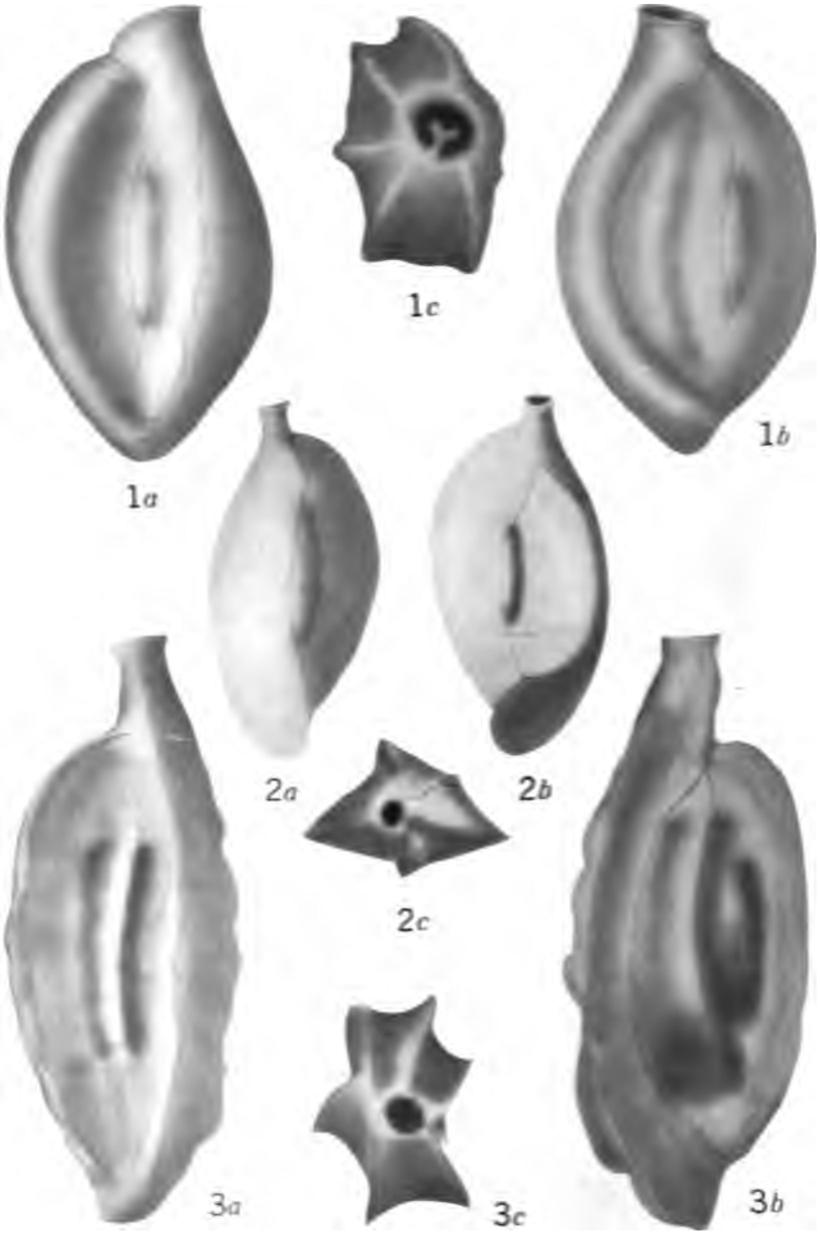
4. *Quinqueloculina crassa*, var. *subcuneata*. × 26. D5151. *a*, side view; *b*, reverse view; *c*, apertural view.

5. *Quinqueloculina boueana*. × 26. D5358.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 578.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 578.

## PLATE 90.

FIG. 1. *Quinqueloculina contorta.* × 66. D5572. *a*, side view; *b*, reverse side; *c*, apertural view.

2. *Quinqueloculina ferussacii.* × 20. D5164. *a*, side view; *b*, reverse side; *c*, apertural view.

3. *Quinqueloculina polygona.* × 66. D5181. *a*, side view; *b*, reverse side; *c*, apertural view.

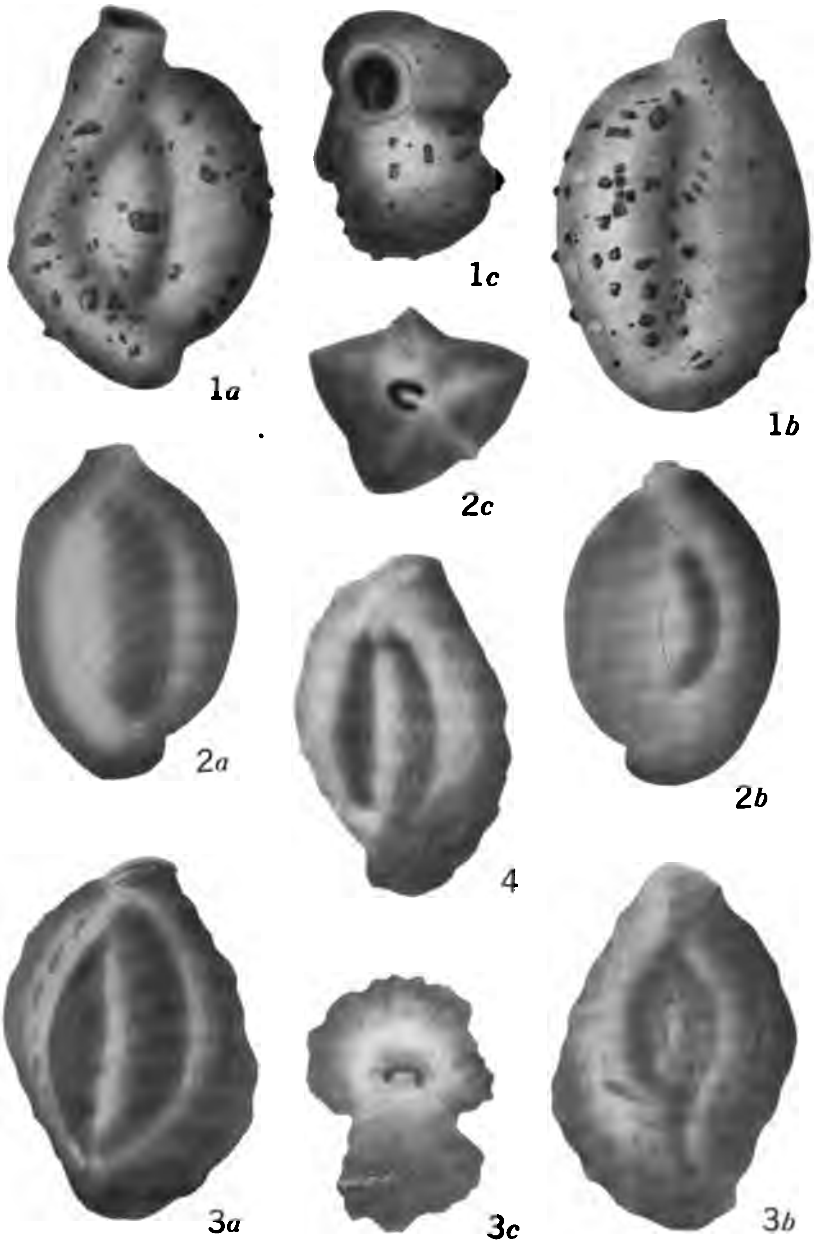
## PLATE 91

Fig. 1. *Quinqueloculina agglutinans*. × 23. D5106. *a*. side view; *b*. reverse side; *c*. apertural view.

2. *Quinqueloculina venusta*. × 23. D5147. *a*. side view; *b*. reverse side; *c*. apertural view.

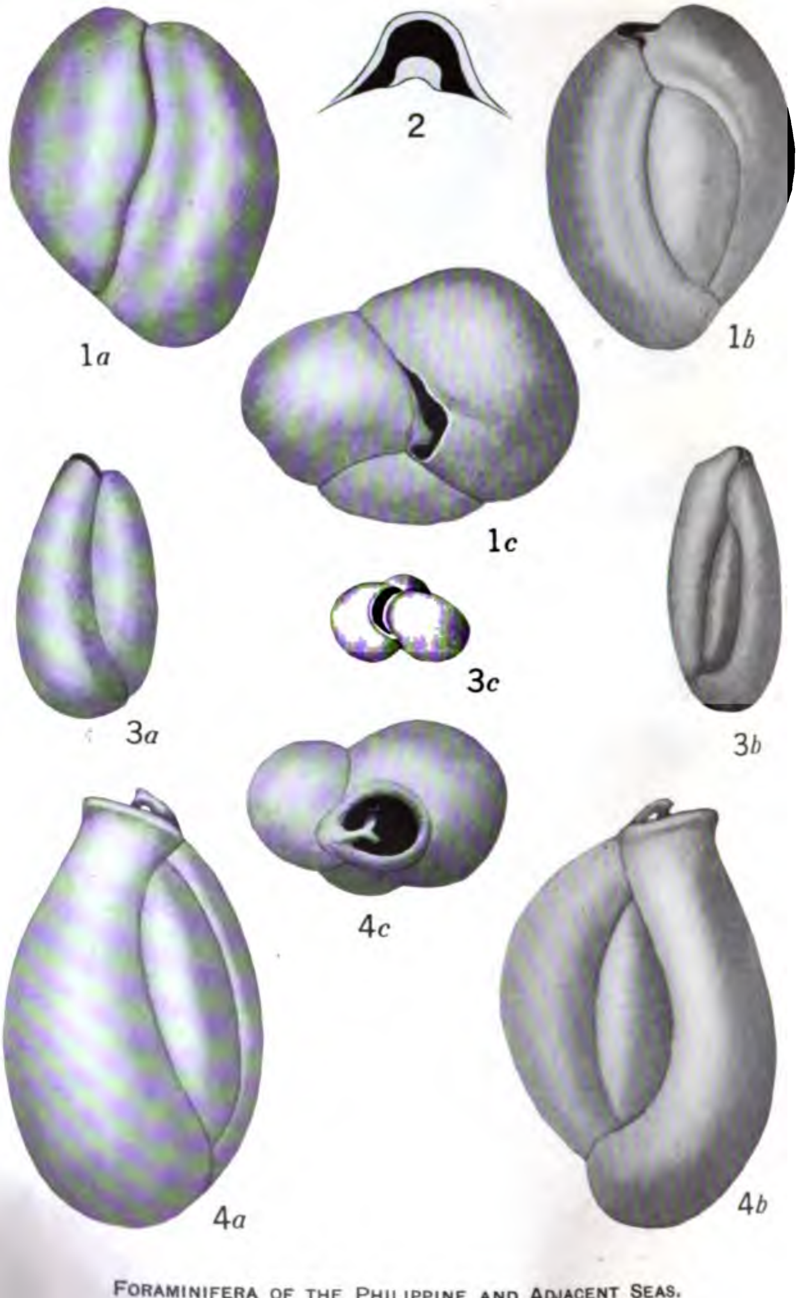
3. *Quinqueloculina sculpturata*. × 23. D5145. *a*. side view; *b*. reverse side; *c*. apertural view.

4. *Quinqueloculina sculpturata*. × 23. D5143.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 580.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 581.

## PLATE 92.

FIG. 1. *Triloculina circularis.* × 39. D5236. *a*, side view; *b*, opposite side; *c*, apertural view.

2. *Triloculina circularis.* × 75. D5236. Aperture with tooth.

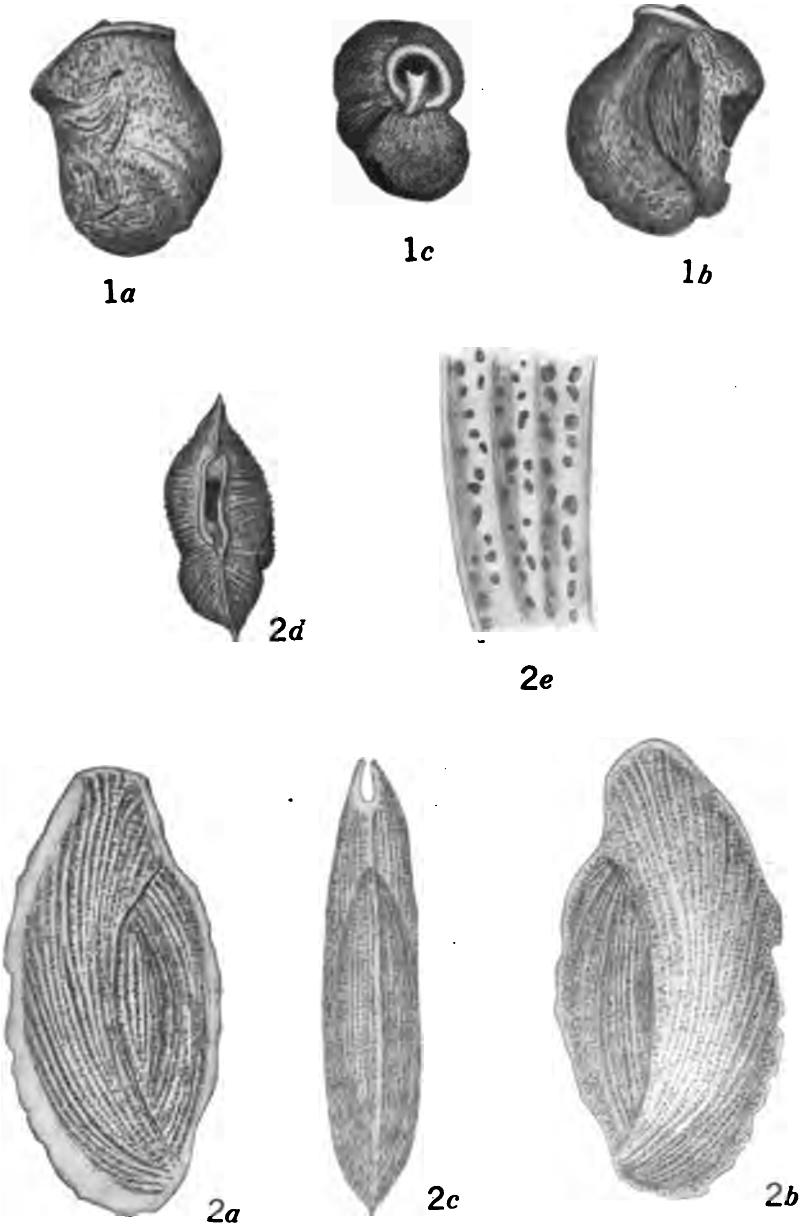
3. *Triloculina oblonga.* × 39. D5214. *a*, side view; *b*, opposite side; *c*, apertural view.

4. *Triloculina cuneata.* × 75. *a*, side view; *b*, opposite side; *c*, apertural view.

PLATE 36

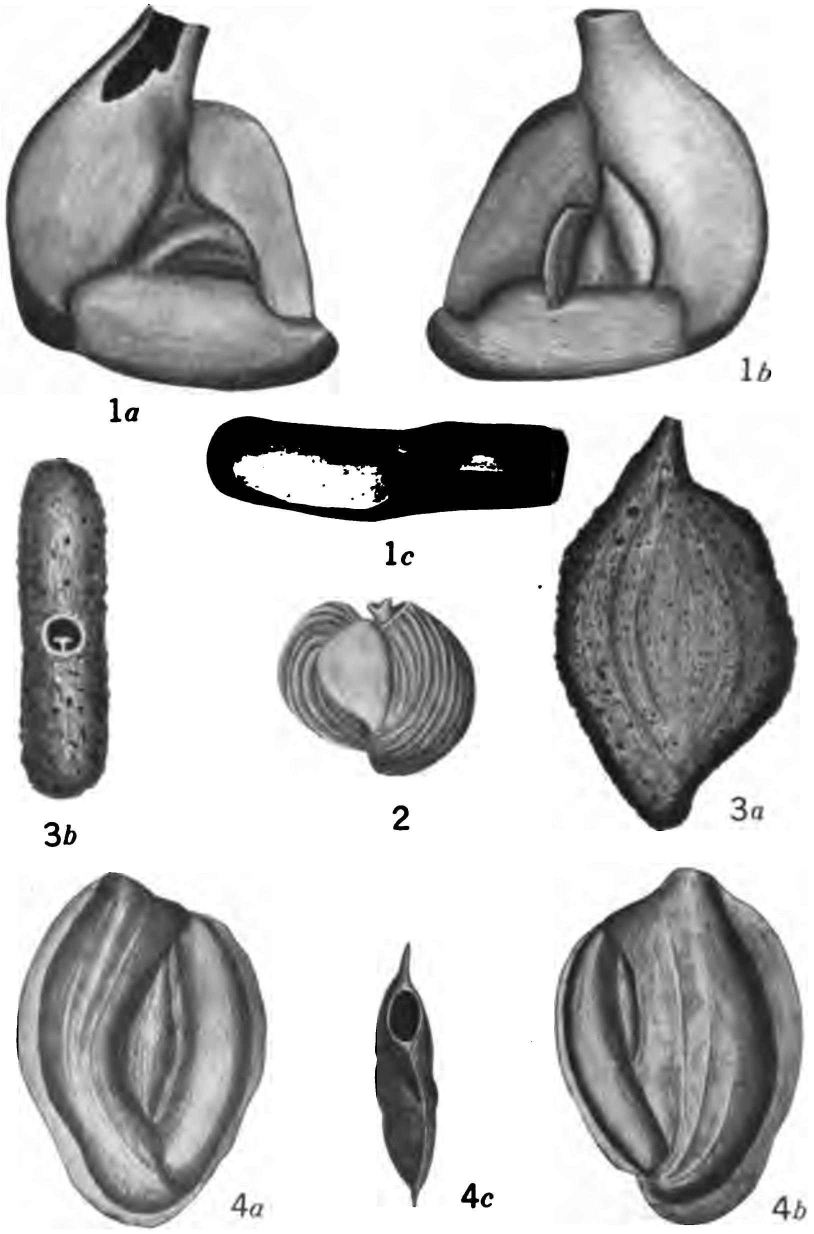
FIG. 1. *Triloculina* [illegible] var. [illegible]. × [illegible]. Sand Island. *a*, side view; *b*, opposite side; *c*, apertural view.

2. *Triloculina* [illegible]. *a*, side view; *b*, opposite side; *c*, edge view; *d*, apertural view. × 13. *e*, portion of surface. × [illegible]. [illegible]



Foraminifera of the Philippine and Adjacent Seas.

For explanation of plate see page 582.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

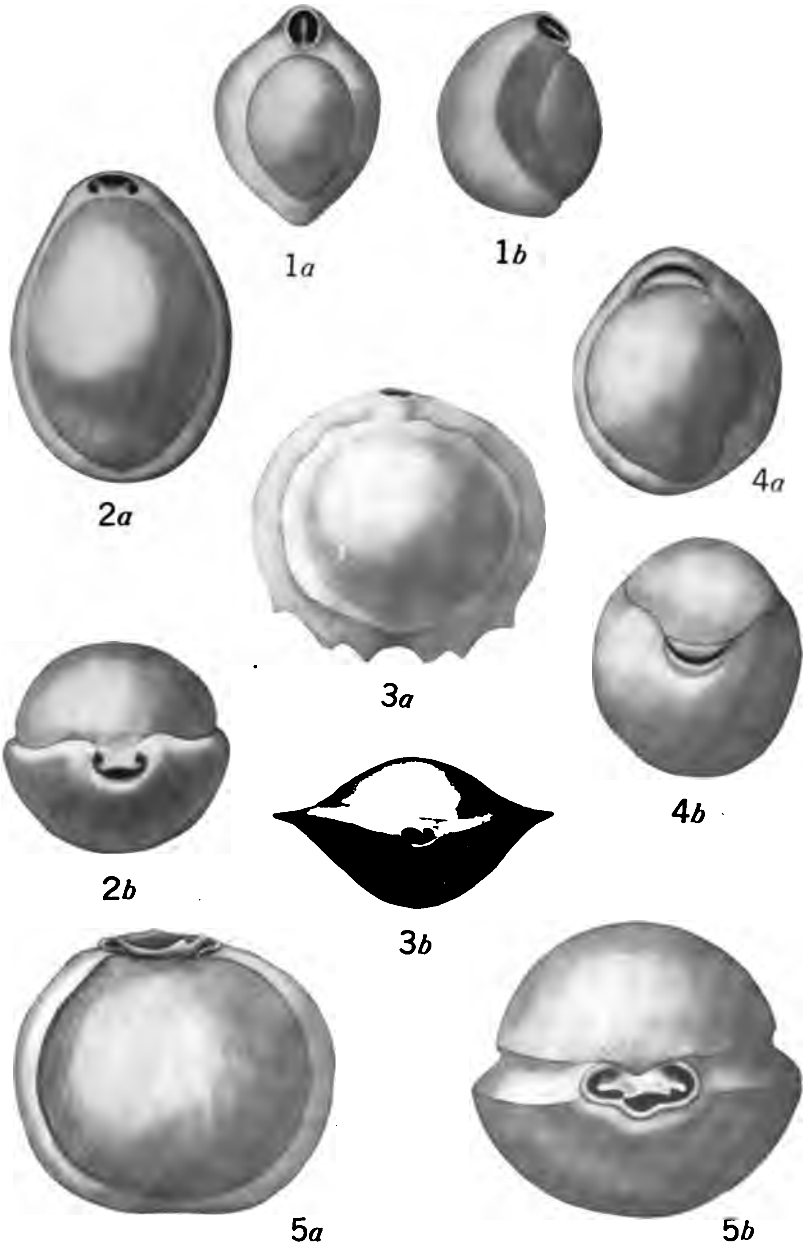
FOR EXPLANATION OF PLATE SEE PAGE 683.

## PLATE 94.

FIG. 1. *Flintina triquetra.* × 10. D5236. *a* and *b*, opposite sides; *c*, apertural view.
2. *Flintina bradyana.* × 20. D5134.
3. *Massilina arenaria.* × 10. D5236. *a*, side view; *b*, apertural view.
4. *Massilina durrandii.* × 20. *a* and *b*, opposite sides; *c*, apertural view.

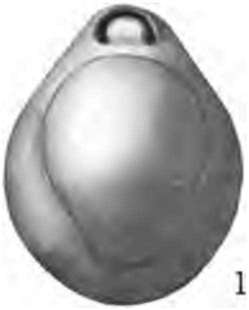
## Plate 95.

Fig. 1. *Biloculina irregularis.* × 30. *a*, front view; *b*, side view.
2. *Biloculina globulus.* × 30. D5580. *a*, front view; *b*, apertural view.
3. *Biloculina serrata.* × 20. D5639. *a*, front view; *b*, apertural view.
4. *Biloculina elongata.* × 20. D5613. *a*, front view; *b*, apertural view.
5. *Biloculina vespertilio.* × 15. D5277. *a*, front view; *b*, apertural view.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 684.



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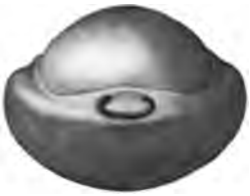

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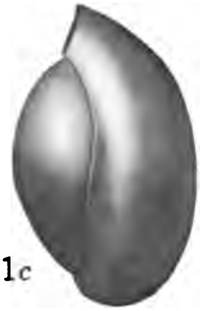
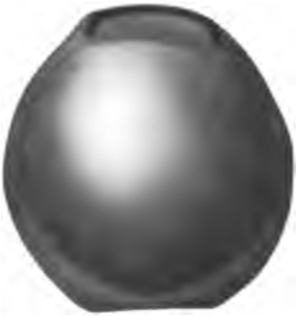


1*c*



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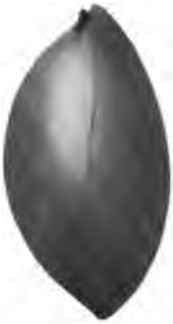

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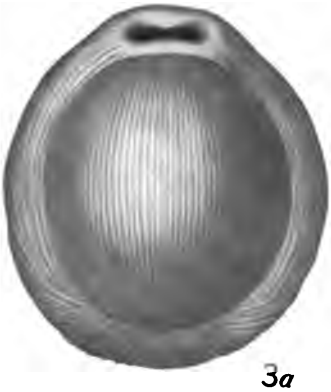

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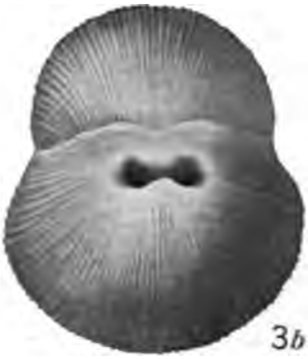


3*b*

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 586.

## PLATE 96.

FIG. 1. *Biloculina anomala*. × 50. D5622. *a*, front view; *b*, side view; *c*, apertural view.

2. *Biloculina depressa*. × 10. D5236. *a*, front view; *b*, side view.

3. *Biloculina comata*. × 17. D5567. *a*, front view; *b*, apertural view.

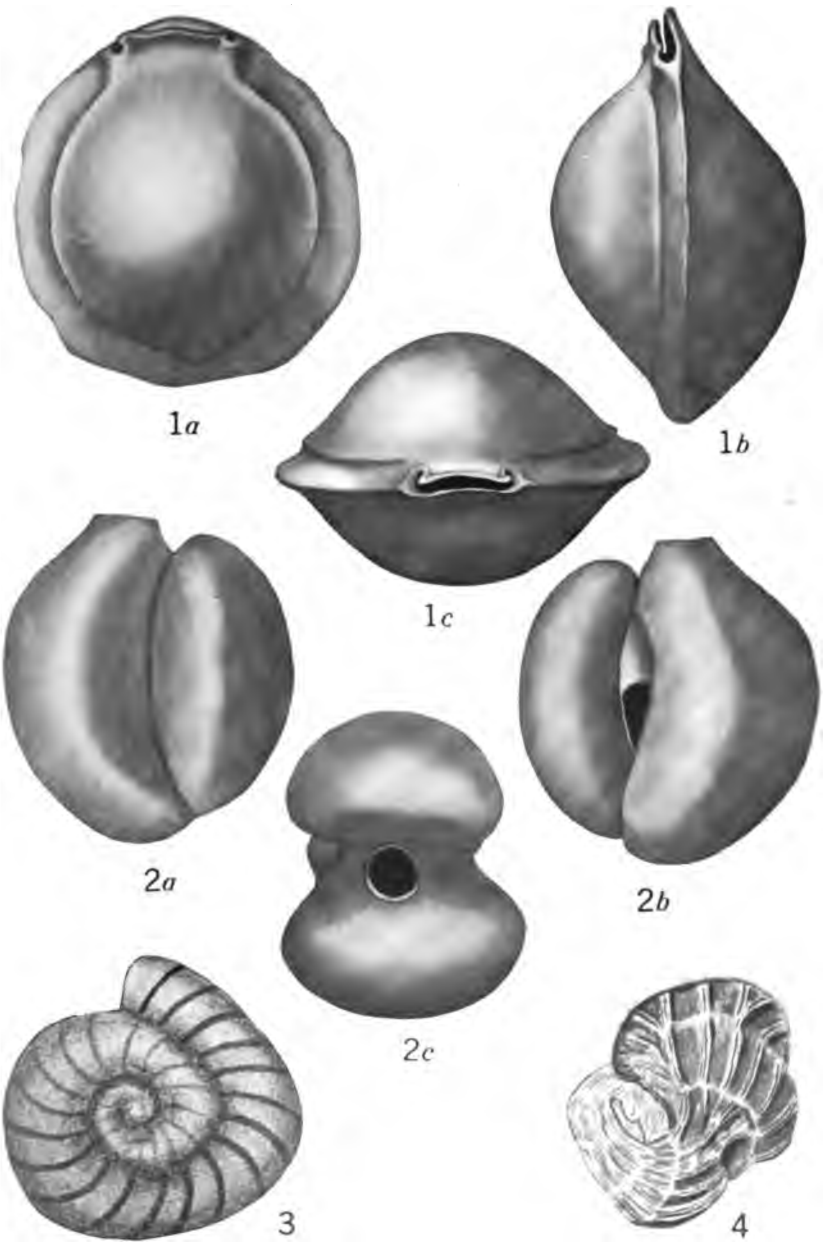
PLATE 97.

FIG. 1. *Biloculina sarsii.* × 24. D5315. *a*, front view; *b*, side view; *c*, apertural view.

2. *Biloculina lucernula.* × 18. D5236. Slightly triloculine form. *a*, side view; *b*, opposite side; *c*, apertural view.

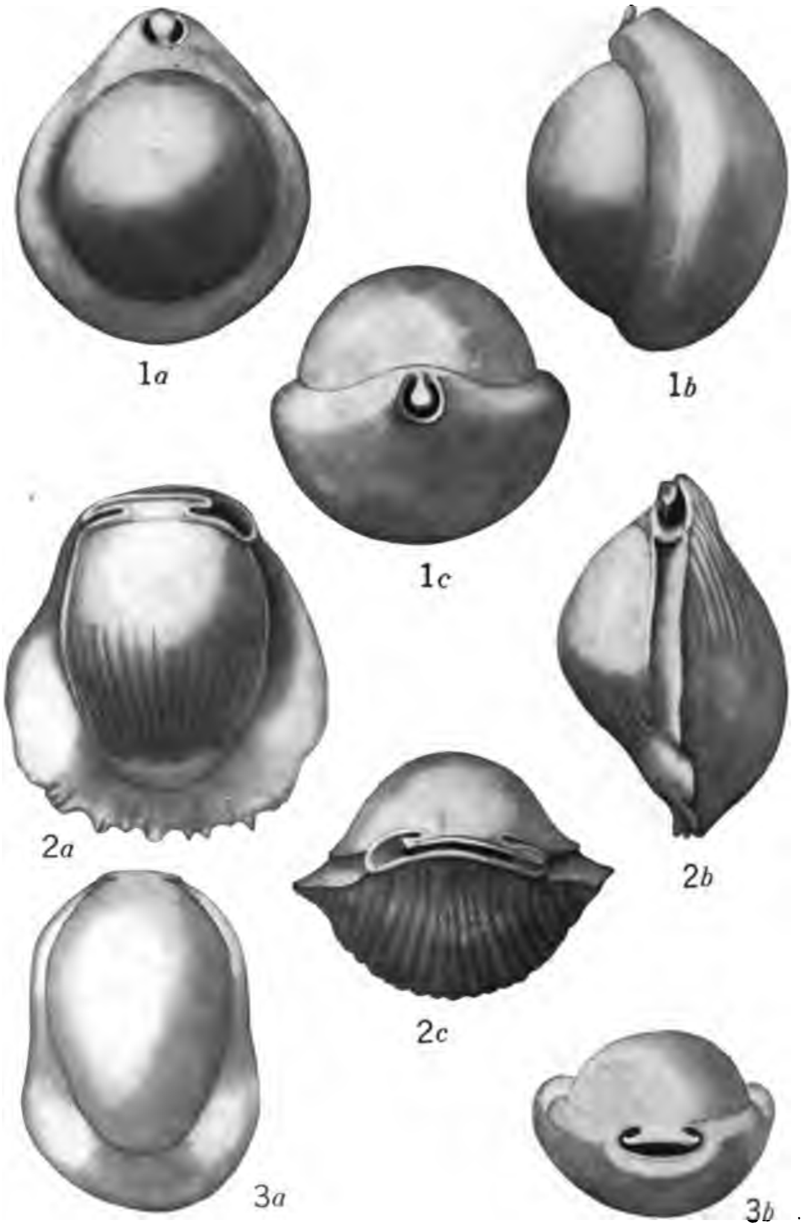
3. *Operculina elegans.* Side view, × 20. From station D5579.

4. *Vertebralina striata*, var. *reticulosa.* Side view, × 60. From station D5160.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 586.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 587.

PLATE 98.

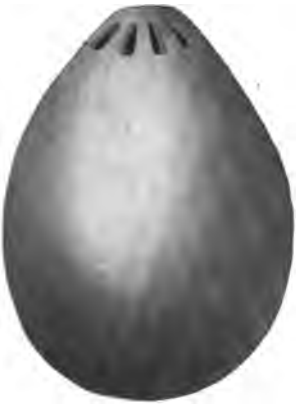
FIG. 1. *Biloculina lucernula.* × 24. D5630. *a*, front view; *b*, side view; *c*, apertural view.

2. *Biloculina denticulata*, var. *striolata.* × 18. D5139. *a*, front view; *b*, side view; *c*, apertural view.

3. *Biloculina denticulata*, var. × 18. D5179. *a*, front view; *b*, apertural view.

## PLATE 99.

FIG. 1. *Nevillina coronata.* × 12. D5160. *a*, front view; *b*, basal view.
2. *Alveolina boscii.* × 8. Exterior of megalospheric form.
3. *Alveolina boscii.* × 12. Transverse section of megalospheric form.
4. *Alveolina boscii.* × 12. Transverse section of microspheric form.
5. *Alveolina boscii.* × 5. Exterior of microspheric form.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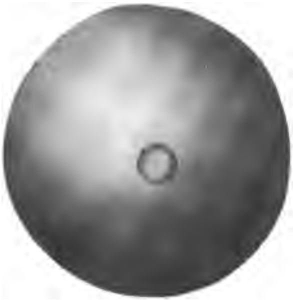
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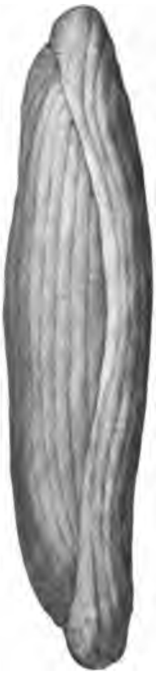
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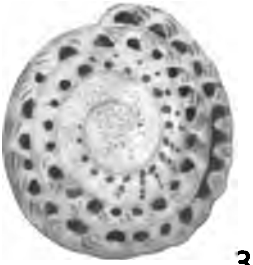
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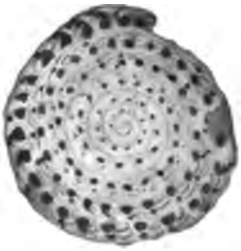
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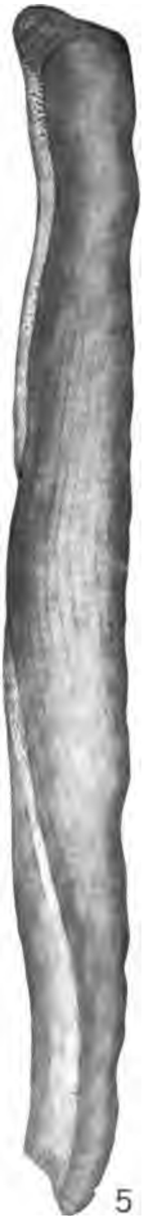
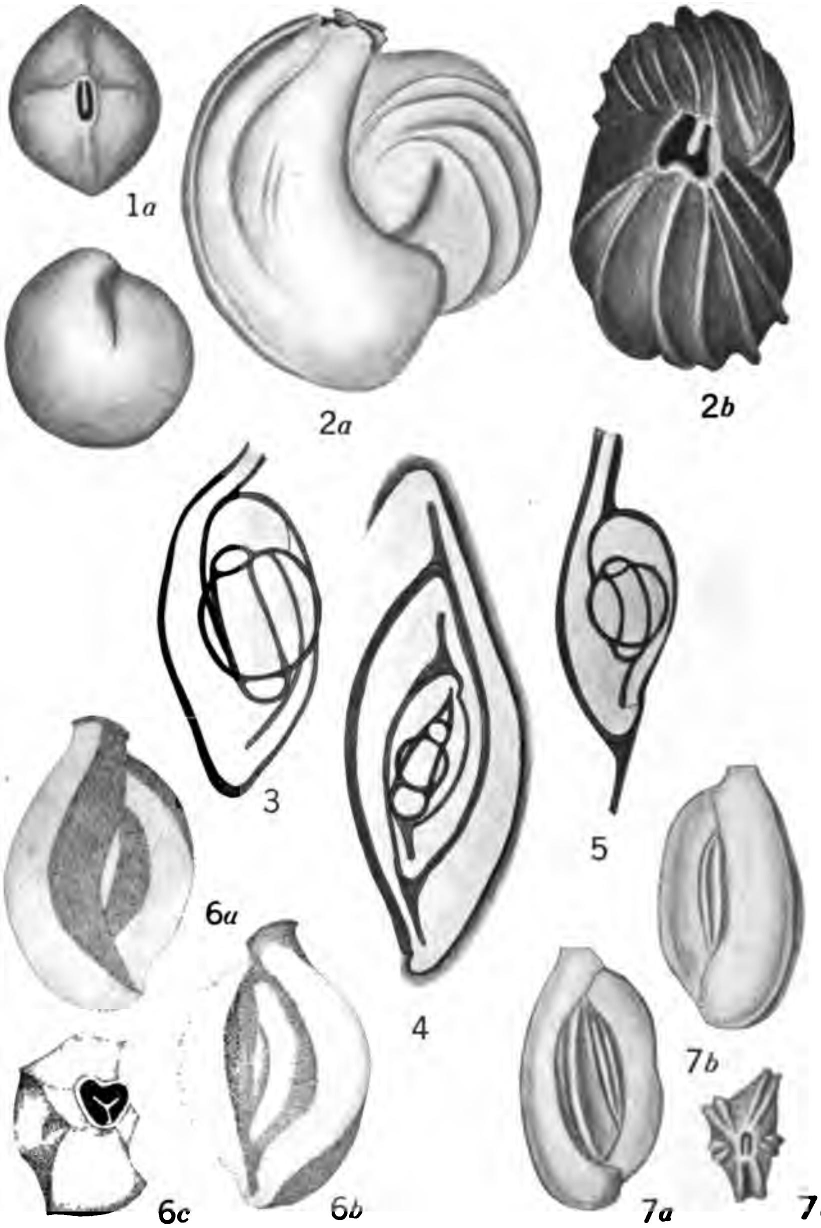

5

FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 588.



FORAMINIFERA OF THE PHILIPPINE AND ADJACENT SEAS.

FOR EXPLANATION OF PLATE SEE PAGE 589.

## PLATE 100.

FIG. 1. *Quinqueloculina curta.?* × 33. D5134. 2-chambered stage. *a*, apertural view; *b*, side view.

2. *Quinqueloculina curta.?* × 33. D5134. Central chambers by transmitted light.

3. *Spiroloculina grateloupi.* × 165. D5159. Central chambers by transmitted light.

4. *Spiroloculina depressa.* × 165. D5220. Central chambers by transmitted light.

5. *Spiroloculina depressa.* × 165. D5220. Central chambers by transmitted light.

6. *Quinqueloculina rugosa.* × 33. *a*, side view; *b*, opposite side; *c*, apertural view.

7. *Quinqueloculina bicarintata.* × 33. *a*, side view; *b*, opposite side; *c*, apertural view.

# INDEX.

Page.

- abbreviata, Textularia 122
- abyssorum, radiata, Rhabdammina 37
  - Rhabdammina 36
  - Rhabdopleura 39
- acaulis, Bolivina 129
- acervalis, Planorbulina 311
- acicula, Vaginulina 262
- acicularis, Nautilus 483
- aculeata, Bulimina 161
    - presli 161
  - Cristellaria 235
  - Nodosaria hirsuta 214
  - Uvigerina 273
- acuta, Jaculella 59
- acuticosta, Lagena 180
- acutimargo, Spiroloculina 398, 410
- acuto-carinata, Cristellaria italica 253
- adhaerens, Ammosphaerulina 100
- adunca, Orbiculina 483
  - Reophax 70
- aduncus, Nautilus 483
  - Reophax 70
- advena, Spiroloculina 410
  - Triloculina 453
- aenariensis, Bolivina 137
  - Brizalina 137
- aequilateralis, Globigerina 293
    - involuta 294
- affinis, Bulimina 165
- affixa, Spiroloculina 410
  - Verneuilina 142
- agglutinans, Ammobaculites 89
  - fistula, Textularia 107
  - Haplophragmium 89, 92
  - nodosaria, Textularia 125
  - porrecta, Textularia 109
  - Quinqueloculina 441, 464
  - Spirolina 89, 92
  - Textularia 113
- agglutinata, Astrorhiza 36
- agglutinatus, Reophax 73
- akneriana, Rotalina 316
  - Truncatulina 316
- alata, Bolivina 129
    - beyrichi 129
  - Vulvulina 129
- albatrossi, Quinqueloculina 435
- algaeformis, Rhizammina 46
- Allomorphina 284
  - trigona 284
- allomorphinoides, Discorbina 306
  - Discorbis 306
  - Valvulina 306
- alternans, Pleurostomella 138
- alveolata, substriata, Lagena 182
- Alveolina 487
  - boscii 487
- alveoliniformis, Miliolina 443
  - Quinqueloculina 443
- Ammobaculites 89
  - agglutinans 89
  - calcareum 90

Page.

- Ammobaculites cassis 91
  - cylindricus 92
  - pseudospirale 94
  - reophaciformis 92
  - tenuimargo 90
- Ammochilostoma 97
  - ringens 82
  - rotundata 97
- Ammodiscinae 61
- Ammodiscus 62
  - exsertus 64
  - incertus 62
    - discoideus 63
  - tenuis 62
- Ammoglobigerina bulloides 285
- Ammolagena 61
  - clavata 61
- ammonoides, Anomalina 323
  - Discorbis 323
  - Nautilus 382
  - Operculina 382
  - Planorbulina 323
  - Rosalina 323
- Ammosphaeroidina 98
  - grandis 98
  - sphaeroidiniformis 98
- Ammosphaerulina 100
  - adhaerens 100
- Amphistegina 370
  - cumingii 383
  - lessonii 370
    - madagascariensis 372
    - radiata 372
  - radiata 372
- Amphorina gracilis 175
  - gracillima 175
- ampullacea, Uvigerina 274
    - asperula 274
- amygdalaeformis, Bolivina 133
- angularis, Clavulina 155
  - Valvulina 155
- angulata, Spiroloculina antillarum 408
    - grata 408
- angulosa, Astrorhiza 35
  - Uvigerina 271
- annularis, Frondicularia 217
  - longistriata, Frondicularia 218
- annulata, Glandulina 189
  - Nodosaria 189
    - radicula 189
- anomala, Biloculina 474
- Anomalina ammonoides 323
  - ariminensis 322
  - bengalensis 320
  - coronata 326
  - grosserugosa 323
  - polymorpha 324
    - cervicornis 325
    - siphonifera 325
  - wuellerstorfi 314
- antennula, Nodosaria 197
- antillarum, angulata, Spiroloculina 408

Page.
antillarum, Spiroloculina.................... 407
aperturalis, Textularia...................... 111
apicula, Quinqueloculina..................... 422
apicularis, Gaudryina........................ 151
apiculata, Lagena............................ 176
sulcata.................. 180
Oolina........................... 176
arenacea, Bigenerina......................... 126
arenaria, Massilina.......................... 446
Spiroloculina.................... 411, 446
arietinus, Nautilus (Lituus)............... 481, 482
Peneroplis....................... 482
pertusus............... 482
ariminensis, Anomalina....................... 322
Planulina........................ 322
articulata, Cristellaria...................... 222
Robulina......................... 222
Articulina................................... 448
sagra.............................. 448
Aschemonella................................ 64
catenata...................... 64
Aschemonellinae............................. 64
aspera, Textularia........................... 112
asperula, ampullacea, Uvigerina............. 274
Massilina........................ 447
Spiroloculina.................... 447
Uvigerina........................ 274
Assilina discoidalis......................... 379
Astrorhiza.................................. 35
agglutinata....................... 36
angulosa.......................... 35
catenata.......................... 64
granulosa......................... 35
Astrorhizidae............................... 35
Astrorhizinae................................ 35
atrata, Textularia sagittula................. 103
attenuata, Dendrophrya....................... 57
Gaudryina........................ 152
auricula, Nautilus........................... 329
Pulvinulina...................... 329
auriculata, substriata, Lagena.............. 182
austriaca, Valvulina......................... 144
triangularis............ 144
baccata, Gaudryina........................... 150
bacillaris, Reophax.......................... 67
baculatus, Calcarina......................... 353
Tinoporus........................ 353
Baculogypsina................................ 359
sphaerulatus................. 359
balaniformis, proteiformis, Carpenteria...... 361
bartschi, Flintina............................ 465
Operculina....................... 376
ornata, Operculina............... 378
plana, Operculina................ 377
Bathysiphon.................................. 41
filiformis...................... 41
flavidum........................ 44
flavidus........................ 44
giganteus............ 44
papyraceus..................... 45
rufum.......................... 42
rufus.......................... 42
rufuscens...................... 43
beccarii, Nautilus........................... 345
Rotalia............. ............ 345
(Turbinulina)............. 345
bengalensis, Anomalina....................... 320
bertheliniana, Miliolina..................... 457
tricarinata.......... 457
Triloculina................... 457
bertheloti, Discorbina........................ 305
Discorbis......................... 305
Rosalina.......................... 305
berthelotiana, subornata, Pulvinulina....... 333
beyrichi, alata, Bolivina..................... 129
Bolivina......................... 128
bicarinata, Fissurina......................... 184
Lagena........................... 184
Quinqueloculina.................. 425
bicornis, elegans, Miliolina.................. 425
Quinqueloculina........... 425
bifrons, Sagrina.............................. 277
Siphogenerina.................... 277
(Sagrina)............ 277
striatula, Siphogenerina ............ 278
Bigenerina.................................... 125
arenacea.......................... 126
capreolus......................... 127
nodosaria......................... 125
pennatula ........................ 127
bilocularis, Reophax.......................... 74
Biloculina.................................... 469
anomala........................... 474
comata............................ 477
contraria......................... 412
denticulata....................... 476
striolata............. 477
depressa.......................... 469
elongata.......................... 473
globulus.......................... 474
irregularis....................... 479
lucernula......................... 475
millettii......................... 479
murrhyna.......................... 470
pisum............................. 475
ringens........................ 471, 472
denticulata............. 476
striolata................ 477
sarsii............................ 471
serrata........................... 471
tubulosa.......................... 475
vespertilio....................... 472
Bolivina...................................... 128
acaulis........................... 129
aenariensis....................... 137
alata............................. 129
amygdalaeformis................... 133
beyrichi.......................... 128
alata..................... 129
compacta.......................... 137
costata........................... 134
dilatata.......................... 125
hantkeniana....................... 132
karreriana........................ 131
carinata............... 132
limbata........................... 135
nobilis........................... 130
punctata.......................... 136
pusilla........................... 138
pygmaea........................... 136
quadrilatera...................... 125
robusta........................... 129
compacta............... 137
schwageriana...................... 130

Page.
Bolivina sculpturata........ 134
  semicostata........ 134
  subangularis........ 135
boscii, Alveolina........ 487
  Oryzaria........ 487
boueana, Miliolina........ 425
  Nonionina........ 366
  Quinqueloculina........ 425
bradyana, Flintina........ 467
  Quinqueloculina........ 432
bradyi, Clavulina........ 155
  Cribrostomoides........ 83
  Cristellaria........ 243
  Cyclammina........ 88
  Cymbalopora poeyi........ 308
  Gaudryina........ 149
  Hauerina........ 450
  Vaginulina........ 260
  Verneuilina........ 141
Brizalina aenariensis........ 137
broeckhiana, Rotalia........ 346
brukenthali, Vaginulina........ 260
brunnensis, Uvigerina........ 272
buchiana, Bulimina........ 160
  presli........ 160
bulbosa, Spiroplecta........ 102
Bulimina........ 159
  aculeata........ 161
  affinis........ 165
  buchiana........ 160
  elegans, exilis........ 159
  elegantissima........ 167, 168
  elongata........ 165
  inflata........ 160
  marginata........ 159
  ovata........ 164
  polystropha........ 139
  presli, aculeata........ 161
    buchiana........ 160
    elegantissima........ 167
    marginata........ 159
  pupoides........ 161
    marginata........ 159
    spinulosa........ 161
  pyrula........ 162
    perversa........ 163
    spinescens........ 164
  subaffinis........ 165
  subteres........ 107
Buliminella........ 167
  contraria........ 167
  elegantissima........ 168
  subteres........ 167
Bulimininae........ 159
bulla, Placopsilina........ 51
  Tholosina........ 51
bulloides, Ammoglobigerina........ 285
  Cymbalopora........ 309
  Globigerina........ 96, 285
  Rosalina........ 309
  Sphaeroidina........ 297
  Tretomphalus........ 309
  triloba, Globigerina........ 286
calcar, Calcarina........ 350
  var. hispida........ 356
  Cristellaria........ 231

Page.
calcar, Nautilus........ 231, 233
  Robulina........ 231
  Rotalia........ 350
calcarata, Cristellaria........ 232
calcareum, Ammobaculites........ 89
  Haplophragmium........ 89
Calcarina........ 350
  baculatus........ 354
  calcar........ 350
    var. hispida........ 356
  defrancii........ 353
  hispida........ 356
  quoyi........ 356
  spengleri........ 351, 356
    var........ 353
  tetraedra........ 358
canaliculata, Spiroloculina........ 395
canariensis, Haplophragmium........ 79
  Haplophragmoides........ 79
  Lituola........ 79
    nautiloidea........ 79
  Nonionina........ 79
  Placopsilina........ 79
  Pulvinulina........ 338
  Rotalina........ 338
  Uvigerina........ 275
cancellata, Cyclammina........ 84, 85
candeiana, Textularia........ 109
    sagittula........ 109
Candeina........ 296
  nitida........ 296
    triloba........ 296
caperata, Clavulina........ 153
  Tritaxia........ 153
  Tritaxilina........ 153
capreolus, Bigenerina........ 127
  Grammostomum........ 127
  Valvulina........ 127
carinata, Bolivina karreriana........ 132
  Cornuspira........ 392
  Operculina........ 392
  Textularia........ 121
carinatus, Peneroplis........ 482
    pertusus........ 482
carpenteri, Cycloclypeus........ 386
  Hormosina........ 77
Carpenteria........ 360
  balaniformis, proteiformis........ 361
  monticularis........ 362
  proteiformis........ 361
  rhaphidodendron........ 363
  utricularis........ 360
Cassidulina........ 171
  crassa........ 172
  globulosa........ 293
  laevigata........ 171
  subglobosa........ 171
Cassidulininae........ 171
cassinoides, Cristellaria........ 244
cassis, Ammobaculites........ 91
  Cristellaria........ 244
  Haplophragmium........ 91
  Lituola........ 91
  Nautilus........ 244
castanea, Thurammina papillata........ 52

Page.
catenata, Aschemonella 64
  Astrorhiza 64
  Textularia 112
catenulata, Haliphysema 58
  Nodosaria 198
  Saccammina sphaerica 48
celata, Planispirina 449
  Sigmoilina 449
cenomana, Lituola 95
    (Placopsilina) 95
  Placopsilina 95
Ceriopora globulus 360
cervicornis, Anomalina polymorpha 325
chilostoma, Gaudryina 150
    pupoides 150
  Textilaria 150
Chilostomella 283
chilostomella, Gaudryina pupoides 150
Chilostomella, grandis 283
  ovoidea 283
Chilostomellidae 283
Chrysalidina 144
  dimorpha 144
Cibicides reiulgens 312
circularis, Miliolina 462
  Spiroloculina 403
  Triloculina 462
clavata, Ammolagena 61
  Lagena 174
  Oolina 174
  Trochammina irregularis 61
  Webbina 61
  Webbinella 61
Clavulina 145
  angularis 155
  bradyi 155
  caperata 153
  communis 154
  cylindrica 155
  difformis 156
  indiscreta 145
  parisiensis 156
  primaeva 158
  rotundata 157
columellaris, Sagrina 276
  Siphogenerina 276
comata, Biloculina 478
communis, Clavulina 154
  Dentalina 192
  Nodosaria 193
    (Dentalina) 192
  Verneuilina 154
compacta, Bolivina 137
    robusta 137
complanata, laciniata, Orbitolites 487
  Operculina 373
  Orbitolites 486
  plicata, Orbitolites 487
compressa, Cristellaria 247
  Cyclammina 85
  Hauerina 450
  Nouria 102
  Polymorphina 266
compressiuscula, Rotalia papillosa 348
compressum, Haplophragmium 80
concamerata, Pulvinulina 328
    repanda 328

Page.
concamerata, Rotalina 328
  Serpula 328
concava, Textularia 119
concavum, Plecanium 119
concentrica, Pulvinulina 327
conglobata, Globigerina 290
conglomerata, Globigerina 295
conica, Textularia 123
  Valvulina 142
    triangularis 142
consobrina, emaciata, Nodosaria 195
contorta, Miliolina 432
  Quinqueloculina 432
contraria, Biloculina 412
  Buliminella 167
  Planispirina 412
  Rotalina 167
convergens, Cristellaria 228
convexa, Triloculina tricarinata 456
convexiuscula, Spiroloculina 409
Cornuspira 387
  carinata 392
  crassisepta 392
  foliacea 387
    expansa 388
  involvens 389
    substriatula 389
  lacunosa 391
Cornuspirininae 387
cornuta, Virgulina 170
coronata, Anomalina 326
  Nevillina 480
corrugata, Patellina 303
costata, Bolivina 134
  Cristellaria 239, 243
  Lenticulina 239
  Lingulina 214
  Marginulina 256
  multicosta, Cristellaria 240
  Robulina 239
  subdecorata, Cristellaria 241
  sublaevis, Cristellaria 242
costatus, Nautilus 239
    (Orthoceras) 256
  Spincterules 239
costifera, plena, Spiroloculina 405
  Spiroloculina 405
costulata, Nodosaria 187
    stipitata 187
  Siphogenerina raphanus 281
crassa, Cassidulina 172
  Miliolina 420
  Pulvinulina 338
  Rotalina 338
  subcuneata, Quinqueloculina 423
crassatina, Miliolina 443
  Quinqueloculina 443
crassisepta, Cornuspira 392
  Textularia 121
craticulata, Polystomella 368
craticulatus, Nautilus 368
crenata, Massilina 445
  Spiroloculina 445
crepidula, Cristellaria 248
  Nautilus 248
cretacea, Globigerina 287
Cribrostomoides 83

Page.

- Cribrostomoides bradyi 83
- crispa, Polystomella 368
- crispus, Nautilus 368
- Cristellaria 220
  - aculeata 235
  - articulata 222
  - bradyi 243
  - calcar 231
  - calcarata 232
  - cassinoides 244
  - cassis 244
  - compressa 247
  - convergens 228
  - costata 239, 243
    - multicosta 240
    - subdecorata 241
    - sublaevis 242
  - crepidula 248
  - cultrata 220, 238
    - decorata 221
  - denticulifera 238
  - dorso-costata 247
  - echinata 233
  - expansa 236
    - planulata 237
  - gemmata 239
  - gibba 228
  - helicina 250
  - helicinoides 251
  - italica 252
    - acuto-carinata 253
  - latifrons 254
  - mamilligera 235
  - orbicularis 224
    - papillata 226
    - subcarinata 225
    - subumbonata 226
  - papillosa 234
  - paucicostata 248
  - perprocera 250
  - reniformis 221
- Cristellaria (Robulina) echinata 233
  - rotulata 223
    - umbonata 223
  - (Saracenaria) italica 252
  - schloenbachi 249
  - submamilligera 235
  - tenuis 250
  - tricarinella 230
    - spinipes 230
  - tumido-costata 245
    - labyrinthica 245
  - variabilis 229
  - vortex 227
- culter, Planorbulina 320
  - Truncatulina 320
- cultrata, Cristellaria 220, 238
  - decorata, Cristellaria 221
  - Robulina 220
- cultratus, Robulus 220
- cumingii, Amphistegina 383
  - Nummulites 383
- cuneata, incisa, Triloculina 462
  - Miliolina 461
  - Triloculina 461
- curta, Quinqueloculina 426
- cuvieriana, Miliolina 426
- Cyclammina 84

Page.

- Cyclammina bradyi 88
  - cancellata 84
  - compressa 85
  - pauciloculata 86
  - pusilla 87
- Cycloclypeus 386
  - carpenteri 386
  - guembelianus 386
- cylindracea, Spirolinites 483
- cylindraceus, Peneroplis 483
- cylindrica, Clavulina 155
  - Marsipella 41
  - Polytrema 365
  - Reophax 70
- cylindricum, Sporadotrema 365
- cylindricus, Ammobaculites 92
  - Reophax 70
- Cymbalopora 308
  - bulloides 309
  - poeyi 308
    - bradyi 308
    - var 308
- decorata, Cristellaria cultrata 221
- defrancii, Calcarina 353
- dehiscens, Sphaeroidina 297
- Dendrophrya 56
  - attenuata 57
  - ramosa 56
    - robusta 57
- Dentalina communis 192
    - Nodosaria 192
  - emaciata 195
  - legumen, linearis 261
  - mucronata 195
  - obliqua, Nodosaria 195, 210
  - roemeri 193
  - soluta 192
  - subnodosa 139
- dentaliniformis, Reophax 68
- denticulata, Biloculina 476
    - ringens 476
  - Spirillina limbata 302
  - striolata, Biloculina 477
- denticulifera, Cristellaria 238
- depressa, Biloculina 489
  - Spiroloculina 394
  - tubercalata, Heterostegina 364
- diaphana, Iridia 47
- difflugiformis, testacea, Reophax 50
  - Proteonina 49
  - Reophax 49
- digitata, Globigerina 288
- dilatata, Bolivina 128
- dimorpha, Chrysaladina 144
  - Sagrina 279
  - Siphogenerina 279
  - Uvigerina (Sagrina) 279
- Dimorphina striata 280
- discoidalis, Assilina 379
  - involuta, Operculina 380
  - Operculina 379
- discoideus, Ammodiscus incertus 63
- Discorbina allomorphinoides 306
  - bertheloti 305
  - orbicularis 305
  - rugosa 306
  - saulcii 307
- Discorbis 303

Page.
Discorbis allomorphinoides 306
  ammenoides 323
  bertheloti 305
  orbicularis 305
  rugosa 306
  sp 307
  subobtusa 304
  vilardeboana 304
discreta, Rhabdammina 39
disparilis, Miliolina 424
  Quinqueloculina 424
distans, Reophax 66
divaricans, Sagenina 60
dorso-costata, Cristellaria 247
dubia, Haplostiche 78
  Lituola 78
  Nodosaria 78
duplex, Orbitolites 485
durrandii, Massilina 446
  Miliolina 446, 479
echinata, Cristellaria (Robulina) 233
  Robulina 233
Ehrenbergina 172
  serrata 172
elegans, exilis, Bulimina 159
  Miliolina bicornis 425
  Operculina 381
  Pulvinulina 342
  Quinqueloculina bicornis 425
  Rotalia (Turbinulina) 342
  Spiroloculina 406
  Vaginulina 258
    legumen 258
elegantissima, Bulimina 167, 168
  presli 167
  Buliminella 167, 168
  Polymorphina 267
elongata, Biloculina 473
  Hormosina 76
  Hyperammina 53, 54
  Lagena 175
  Miliola 175
emaciata, Dentalina 195
  Nodosaria consobrina 195
emaciatum, Haplophragmium 80
  Haplophragmoides 80
Entosolenia marginata 182
  lagenoides 183
excavata, Spiroloculina 120, 396
  Textularia 120
exigua, Pulvinulina 340
exilis, Bulimina elegans 388
expansa, Cornuspira foliacea 388
  Cristellaria 236
  planulata, Cristellaria 237
exsertus, Ammolagena 64
Faujasina 347
ferussacii, miliolina 429
  Quinqueloculina 429
filiformis, Bathysiphon 41
  Gaudryina 151
  Nodosaria 194
fimbriata, Pulvinulina menardii 335
findens, Lituola 71
  Reophax 71
Fissurina bicarinata 184
Fissurina laevigata 174
  staphyllearia 181
fistula, Textularia agglutinans 107
fistulosa, Spiroplecta sagittula 107
  Textularia sagittula 104
flavidum, Bathysiphon 44
flavidus, Bathysiphon 44
  giganteus, Bathysiphon 44
flintii, Gaudryina 146
  Textularia 113
Flintina 465
  bartschi 465
  bradyana 467
  triquetra 466
foliacea, Cornuspira 387
  expansa, Cornuspira 388
  Textularia 117
foliaceus, Orbis 387
formosa, Lagena 183
fragillisma, Hauerina 451
  Spiroloculina 451
friabilis, Hyperammina 54
frondescens, Sagenella 60
  Sagenina 60
Frondicularia 216
  annularis 217
    longistriata 218
  inaequalis 216
  philippinensis 216
  plicata 219
fusca, Miliolina 442
  Psammosphaera 46
  Quinqueloculina 442
  Rotalina 143
  Valvulina 143
fusiformis, Proteonina 49
  Reophax 49
gaimairdi, Operculina 375
Gaudryina 146
  apicularis 151
  attenuata 152
  baccata 150
  bradyi 149
  chilostoma 150
  filiformis 151
  flintii 146
  paupercula 148
  pseudofiliformis 151
  pupoides 149
    chilostoma 150
    chilostomella 150
  quadrangularis 147
  robusta 152
  rugosa 146
  scabra 146
  siphonella 151
  subrotundata 146
  triangularis 148
gemmata, Cristellaria 239
gibba, Cristellaria 228
  Polymorphina 267
    (Globulina) 267
gigantea, Marsipella 40
giganteus, Bathysiphon flavidus 44
Girvanella vagans 55
glabra, Marginulina 254

Page.

- Glandulina annulata 185
  - laevigata 185
    - Nodosaria 185
    - striatula, Nodosaria 186
  - rotundata 185
    - Nodosaria 185
- Globigerina 285
  - aequilateralis 293
    - involuta 294
  - bulloides 96, 285
    - triloba 286
  - conglobata 290
  - conglomerata 295
  - cretacea 287
  - digitata 288
  - helicina 291
  - inflata 289
  - rubra 289
  - sacculifera 291
  - triloba 286
- Globigerinidae 285
- globigeriniformis, Haplophragmium 96
  - Lituola (Haplophragmium) 96
  - nautiloidea 96
  - Trochammina 96
- globosa, Lagena 173
- globosum, Vermiculum 173
- globulifera, Hormosina 74
  - Ramulina 282
- (Globulina) gibba, Polymorphina 267
- globulosa, Cassidulina 293
- globulus, Biloculina 474
  - Ceriopora 360
  - Gypsina 360
- goësii, Textularia 113
- gracilis, Amphorina 175
  - Lagena 175, 181
- gracillima, Amphorina 175
  - Lagena 175
- gramen, Textularia 105
- Grammostomum capreolus 127
- grandiformis, Haplophragmoides 82
- grandis, Ammosphaeroidina 98
  - Chilostomella 283
  - Lingulina 215
- granulosa, Astrorhiza 35
  - Marsipella 35
  - Operculina 381
- grata, angulata, Spiroloculina 408
  - Spiroloculina 407
- grateloupi, incisa, Spiroloculina 397
  - Spiroloculina 396
- grosserugosa, Anomalina 323
  - Truncatulina 323
- guembelianus, Cycloclypeus 386
- guttifera, Reophax 69
- (Guttulina) problema, Polymorphina 264
  - sororia, Polymorphina 265
- Gypsina 360
  - globulus 360
- (Gyroidina) orbicularis, Rotalia 346
  - soldanii, Rotalia 349
- haidingeri, Lagena 178
    - striata 178
  - Oolina 178
  - Planorbulina 315
  - Rotalina 315
  - Truncatulina 315

Page.

- Haliphysema 58
  - catenulata 58
- hantkeniana, Bolivina 132
- Haplophragmium agglutinans 89, 92
  - calcareum 89, 90, 92
  - canariensis 79
  - cassis 91
  - compressum 80
  - emaciatum 80
  - globigeriniforme 96
  - latidorsatum 81, 83
  - pseudospirale 94
  - ringens 81
  - scitulum 80
  - sphaeroidiniformis 98
  - subglobosum 81
  - tenuimargo 90
  - turbinatum 96
- Haplophragmoides 79
  - canariensis 79
  - emaciatum 80
  - grandiformis 82
  - ringens 81
  - scitulum 80
  - sphaeriloculum 83
  - subglobosum 81
- Haplostiche 78
  - dubia 78
  - soldanii 78
- harrisii, Nouria 101
- hauerii, Pulvinulina 331, 332
  - Textularia 105
- Hauerina 450
  - bradyi 450
  - compressa 450
  - fragilissima 451
  - inconstans 393
  - ornatissima 452
- helicina, Cristellaria 250
  - Globigerina 291
- helicinoides, Cristellaria 251
- herdmani, Ramulina 363
- Heterostegina 384
  - depressa, tubercalata 384
  - suborbicularis 385
  - tubercalata 384
- hexagona, scalariformis, Lagena 177
- hirsuta, aculeata, Nodosaria 214
  - Nodosaria 213
- hispida, Calcarina 356
  - Lagena 176
  - Nodosaria 213
  - sublineata, Nodosaria 207
  - tubulata, Lagena 177
- hispidula, Nodosaria lepidula 203
- Homotrema 364
  - rubrum 364
- Hormosina 74
  - carpenteri 77
  - elongata 76
  - globulifera 74
  - monile 76
  - normani 75
  - ovaliformis 76
  - ovicula 75
- hormosinoides, Reophax nodulosus 69
- horrida, Reophax 73

Page.

- horridus, Reophax 73
- humilis, Truncatulina 321
- Hyperammina 53
  - elongata 53, 54
  - friabilis 54
  - ramosa 54
  - vagans 55
- Hyperammininae 53
- immensa, Textularia 118
- impressa, Spiroloculina 395
- inaequalis, Frondicularia 216
- inaequilateralis, involuta, Globigerina 294
  - Spiroloculina 410
- incerta, Operculina 62
- incertus, Ammodiscus 62
  - discoideus, Ammodiscus 63
- incisa, Spiroloculina grateloupi 397
  - Triloculina cuneata 462
- inconstans, Hauerina 393
  - Opthalmidium 393
- incrassata, Miliolina 443
- indica, Polymorphina problema 265
  - Pulvinulina 332
- indiscreta, Clavulina 145
  - Tritaxia 145
- indivisa, Rhizammina 45
- inflata, Bulimina 160
  - Globigerina 289
  - Textularia solita 111
- inflexa, Nodosaria 191
- insecta, Nodosaria 189
- insignis, Miliolina 458
  - Triloculina 458
- insolita, Nodosaria 191
- interrupta, Uvigerina 275
- involuta, Globigerina inaequilateralis 294
  - Operculina discoidalis 390
- involvens, Cornuspira 389
  - Operculina 389
  - substriatula, Cornuspira 389
- Iridia 47
  - diaphana 47
- irregularis, Biloculina 479
  - clavata, Trochammina 61
  - Rhabdammina 38
  - Trochammina 61
- italica, accuto-carinata, Cristellaria 253
  - Cristellara (Saracenaria) 252
  - Cristellaria 252
  - Saracenaria 252
- Jaculella 59
  - acuta 59
  - obtusa 59
- japonica, Nodosaria 196
- jugosa, Textularia 119
- karreriana, Bolivina 131
  - carinata, Bolivina 132
- kerimbatica, Miliolina 437
  - philippinensis, Quinqueloculina. 437
  - Quinqueloculina 437
  - reticulo-striata, Quinqueloculina. 437
- labyrinthica, Cristellaria tumido-costata 246
- laciniata, Orbitolites complanata 487
- laciniatus, Orbitolites 487
- lactea, oblonga, Polymorphina 266
  - Polymorphina 265
  - Serpula 265

Page.

- lacteum, Vermiculum 265
- lacunosa, Cornuspira 391
- laeve, Vermiculum 173
- laevicostata, Nodosaria 209
- levicostata, Cassidulina 209
- laevigata, Cassidulina 171
  - Fissurina 174
  - Glandulina 185
  - Lagena 174
  - Nodosaria (Glandulina) 185
  - striatula, Nodosaria (Glandulina). 186
- laevis, Lagena 173
- Lagena 173
  - acuticosta 180
  - alveolata, substriata 182
  - apiculata 176
  - auriculata, substriata 182
  - bicarinata 184
  - clavata 174
  - elongata 175
  - formosa 183
  - globosa 173
  - gracilis 181
  - gracillima 175
  - haidingeri 178
  - hexagona, scalariformis 177
  - hispida 176
    - tubulata 177
  - laevigata 174
  - laevis 173
  - lagenoides 183
  - lamellata 184
  - marginata 182
    - (Serpula) 182
  - semistriata 179
  - staphyllearia 171
  - striata 177, 178
    - haidingeri 178
    - semistriata 179
    - strumosa 178
  - strumosa 178
  - sulcata 179
    - apiculata 180
    - Serpula 179
- Lagenidae 173
- Lageninae 173
- lagenoides, Entosolenia marginata 183
  - Lagena 183
- lamarckiana, Quinqueloculina 418
- lamellata, Lagena 184
- larvata, Planorbulina 310
  - vulgaris 310
- lateralis, Pulvinulina 336
  - Rosalina 336
- latidorsata, Nonionina 81
- latidorsatum, Haplophragmium 81, 83
- latifrons, Cristellaria 254
- legumen, elegans, Vaginulina 258
  - linearis, Dentalina 261
  - Nautilus 257
  - Technitella 50
  - Vaginulina 257
- Lenticulina costata 239
- Lenticulites 373
  - rotulata 225
- lepidula, hispidula, Nodosaria 203
  - Nodosaria 203

Page.
lessonii, Amphistegina 370
  madagascariensis, Amphistegina 372
  radiata, Amphistegina 372
limbata, Bolivina 134
  denticulata, Spirillina 302
  Miliolina 422
  Quinqueloculina 422
  Spirillina 301
  Spiroloculina 394
  tuberculo-limbata, Spirillina 302
linearis, Dentalina legumen 261
  Nautilus 261
  Rhabdammina 40
  Vaginulina 261
Lingulina 214
  costata 214
  grandis 215
linnaeana, Miliolina 463
  Triloculina 463
lituiformis, Lituotuba 88
  Trochammina 88
Lituola 71
  canariensis 79
  cassis 91
  cenomana 95
  dubia 78
  findens 71
  (Haplophragmium) globigeriniformis 96
  nautiloidea, canariensis 79
    globigeriniformis 96
  (Placopsilina) cenomana 95
  soldanii 78
  subglobosa 81
Lituolidae 64
Lituotuba 88
  lituiformis 88
(Lituus) arietinus, Nautilus 482
lobatula, Serpula 313
  Truncatulina 313
lobatulus, Nautilus 313
longicostata, Nodosaria pyrula 188
longistriata, Frondicularia annularis 218
lucernula, Biloculina 475
luzonensis, Nodosaria pauciloculata 206
madagascariensis, Amphistegina lessonii 372
mamilligera, Cristellaria 235
margaritifera, Truncatulina 319
  Vaginulina 259
margaritiferus, Nautilus (Orthoceras) 259
marginalis, Orbitolites 484
  Orbulites 484
marginata, Bulimina 159
    presli 159
    pupoides 159
  Entosolenia 182
  Lagena 182
  lagenoides, Entosolenia 183
  Serpula (Lagena) 182
marginatum, Vermiculum 182
Marginopora vertebralis, plicata 487
Marginulina 254, 259
  costata 256
  glabra 254
  philippinensis 257
  raphanus 256
  striatula 255
  tenuis 250

Page.
Marsipella 40
  cylindrica 41
  gigantea 40
  granulosa 35
Massilina 444
  arenaria 446
  asperula 447
  crenata 445
  durrandii 446
  secans, reticulata 444
    tenuistriata 445
menardii, fimbriata, Pulvinulina 335
  Pulvinulina 333
  Rotalia 333
  tumida, Pulvinulina 337
micheliniana, Pulvinulina 339
  Rotalina 339
Miliola elongata 175
Miliolidae 387
Miliolina alveoliniformis 443
  bertheliniana 457
  bicornis, elegans 425
  boueana 425
  circularis 462
  contorta 432
  crassa 423
  crassatina 443
  cuneata 461
  cuvieriana 426
  disparilis 424
  durrandii 479
  ferussacii 429
  fusca 442
  incrassata 443
  insignis 458
  kerimbatica 437
  limbata 422
  linnaeana 463
  oblonga 459
  parkeri 437, 440
  procera 421
  reticulata 434
  rotunda 460
  rupertiana 464
  sclerotica 441
  seminulum 416
  suborbicularis 461
  terquemiana 458
  tricarinata 454, 457, 458
    bertheliniana 457
    plicata 456
    terquemiana 458
  trigonula 452
  triquetra 466
  undosa 432
  valvularis 460
  venusta 420
  vulgaris 417
Miliolites planulata, planissima 401
  trigonula 452
Millepora miniacea 363
  rubra 364
millettii, Biloculina 479
  Nodosaria 202
  Spiroloculina 400
miniacea, Millepora 363
miniaceum, Polytrema 363

Page.
monile, Hormosina 76
monticularis, Carpenteria 362
mucronata, Dentalina 195
  Nodosaria 195
multicosta, Cristellaria costata 240
multistriata, Triloculina trigonula 453
murrhyna, Biloculina 470
nautiloidea, canariensis, Lituola 79
  globigeriniformis, Lituola 96
Nautilus 350, 373
  acicularis 483
  aduncus 483
  ammonoides 382
  auricula, var 329
  beccarii 345
  calcar 231, 233
  cassis 244
  costatus 239
  craticulatus 368
  crepidula 248
  crispus 368
  legumen 257
  linearis 261
  (Lituus) arietinus 482
  lobatulus 313
  obliquus 210
  (Orthoceras) costatus 256
    margaritiferus 259
    pennatula 127
    scalaris 199
    vertebralis 211
  papillosus 234
  pertusus 481
  planatus 482
  pompilioides 366
  radiatus 372
  radicula 190
  raphanus 210
  repandus 326
  spengleri 351
  umbilicatulus 365
  venosus 383
  vortex 227
Nevillina 480
  coronata 480
nitida, Candeina 296
  Spiroloculina 408
  triloba, Candeina 296
nobilis, Bolivina 130
Nodobacularia 415
  tibia 415
nodosa, Nodosaria 139
  Uvigerina 275
Nodosaria 185
  annulata 189
  antennula 197
  Bigenerina 125
  catenulata 198
  communis 192
  consobrina, emaciata 195
  costulata 187
    stipitata 187
  (Dentalina) communis 192
    obliqua 210
  dubia 78
  filiformis 194
  (Glandulina) laevigata 185

Page.
Nodosaria (Glandulina) laevigata 185
    striatula 186
    rotundata 185
  hirsuta 213
    aculeata 214
  hispida 213
    sublineata 207
  inflexa 191
  insecta 189
  insolita 191
  japonica 196
  laevicostata 209
  lepidula 203
    hispidula 203
  millettii 202
  mucronata 195
  nodosa 139
  obliqua 210
  pauciloculata 205
    luzonensis 205
  perversa 208
  protumida 262
  pyrula 187
    longi-costata 188
    semirugosa 187
  radicula 190
    annulata 189
  raphanus 210
  roemeri 193
  scalaris 199
    separans 200
  semirugosa 187
  simplex 186
  soluta 192
  spirostriolata 212
  stipitata, costulata 187
  subcanaliculata 204
  sublineata 207
  subperversa 208
  subpolygona 198
  subscalaris 201
    pauci-costata 201
  substriatula 204
  subtertenuata 213
  Textularia agglutinans 125
  vertebralis 211
Nodosariinae 185
nodulosus, hormosinoides, Reophax 69
  Reophax 68
Nonionina 365
  boueana 366
  canariensis 79
  latidorsata 81
  pompilioides 366
  quinqueloba 366
  umbilicatula 365
normani, Hormosina 75
Nouria 101
  compressa 102
  harrisii 101
Nummulites cumingii 383
  venosa 383
Nummulitidae 365
obliqua, Nodosaria 210
  (Dentalina) 195, 210
obliquiloculata, Pullenia 299
obliquus, Nautilus 210
oblonga, Miliolina 450

Page.

- oblonga, Polymorphina 268
  - lactea 266
  - Pulvinulina 330
  - Rotalina 330
  - scabra, Pulvinulina 330
  - Triloculina 459
- oblongum, Vermiculum 459
- obtusa, Jaculella 59
- Oolina apiculata 176
  - clavata 174
  - haidingeri 178
  - striata 177
- Operculina 373
  - ammonoides 382
  - bartschi 376
    - ornata 378
    - plana 377
  - carinata 392
  - complanata 373
  - discoidalis 379
    - involuta 380
  - elegans 381
  - gaimairdi 375
  - granulosa 381
  - incerta 62
  - involvens 389
  - philippinensis 378
  - venosa 383
- Opthalmidium 393
  - inconstans 393
- orbicularis, Cristellaria 224
  - Discorbina 305
  - Discorbis 305
  - papillata, Cristellaria 226
  - Robulina 224
  - Rosalina 305
  - Rotalia 346
    - (Gyroidina) 346
  - subcarinata, Cristellaria 225
  - subumbonata, Cristellaria 226
- Orbiculina 483
  - adunca 483
- Orbis foliaceus 387
- orbis, Spiroloculina 403
- Orbitolites 484
  - complanata 486
    - laciniata 487
    - plicata 487
  - duplex 485
  - laciniatus 487
  - marginalis 484
- Orbulina 295
  - universa 295
- Orbulites marginalis 484
- ornata, Operculina bartschi 378
  - Truncatulina ungeriana 317
- ornatissima, Hauerina 452
  - Quinqueloculina 442
- Orthocera raphanus 210
- (Orthoceras) costatus, Nautilus 256
  - margaritiferus, Nautilus 259
  - pennatula, Nautilus 127
  - scalaris, Nautilus 199
  - vertebralis, Nautilus 211
- Oryzaria boscii 487
- ovaliformis, Hormosina 76
- ovalis, Sphaerammina 100

Page.

- ovata, Bulimina 164
- ovicula, Hormosina 75
- ovoidea, Chilostomella 283
- papillata, castanea, Thurammina 52
  - Cristellaria orbicularis 226
- papillosa, compressiuscula, Rotalia 347
  - Cristellaria 234
  - Rotalia 347
- papillosus, Nautilus 234
- papyracea, Thurammina 52
- papyraceus, Bathysiphon 45
- parkeri, Miliolina 437, 440
  - Quinqueloculina 440
- parisiensis, Clavulina 156
  - Valvulina 156
- partschiana, Pulvinulina 344
- parva, Psammosphaera 47
- Patellina 303
  - corrugata 303
- patens, Vaginulina 263
- paucicostata, Cristellaria 248
  - Nodosaria subscalaris 201
- pauciloculata, Cyclammina 86
  - luzonensis, Nodosaria 206
  - Nodosaria 205
  - Virgulina 168
- pauperata, Pulvinulina 340
- paupercula, Gaudryina 148
- Peneroplis 481
  - arietinus 482
  - carinatus 482
  - cylindraceus 483
  - pertusus 481
    - arietinus 482
    - carinatus 482
    - planatus 481
  - planatus 481
- pennatula, Bigenerina 127
  - Nautilus (Orthoceras) 127
- perprocera, Cristellaria 250
- pertusus, arietinus, Peneroplis 482
  - carinatus, Peneroplis 482
  - Nautilus 481
  - planatus, Peneroplis 481
- perversa, Bulimina pyrula 163
  - Nodosaria 208
- philippinensis, Frondicularia 216
  - Marginulina 257
  - Operculina 378
  - Pulvinulina 331
  - Quinqueloculina kerimbatica 438
- pigmea, Uvigerina 269
- pilulifer, Reophax 66
- pilulifera, Reophax 66
- pisum, Biloculina 475
- Placopsilina 95
  - bulla 51
  - canariensis 79
  - cenomana 95
- (Placopsilina) cenomana, Lituola 95
- plana, Operculina bartschi 377
- planatus, Nautilus 481
  - Peneroplis 481
    - pertusus 481
- Planispirina 412
  - celata 449
  - cf. striata 413

Page.
Planispirina contraria........ 412
      sigmoidea........ 448
      sphaera........ 413
planissima, Miliolites planulata........ 401
      Spiroloculina........ 401
Planorbulina........ 310
      acervalis........ 311
      ammonoides........ 323
      culter........ 320
      haidingerii........ 315
      larvata........ 310
      ungeriana........ 317
      vulgaris, larvata........ 310
planulata, Cristellaria expansa........ 237
      planissima, Miliolites........ 401
Planulina ariminensis........ 322
Plecanium concavum........ 119
      rugosa........ 114
plena, Spiroloculina costifera........ 405
Pleurostomella........ 138
      alternans........ 138
      subnodosa........ 139
plicata, Frondicularia........ 219
      Marginopora vertebralis........ 487
      Orbitolites complanata........ 487
      Triloculina tricarinata........ 456
poeyi, bradyi, Cymbalopora........ 308
      Cymbalopora........ 308
      Rosalina........ 308
polygona, Quinqueloculina........ 431
polymorpha, Anomalina........ 324
      cervicornis, Anomalina........ 325
      siphonifera, Anomalina........ 325
Polymorphina........ 263
      compressa........ 268
      elegantissima........ 267
      gibba........ 267
      (Globulina) gibba........ 267
      (Guttulina) problema........ 267
            sororia........ 265
      lactea........ 265
            oblonga........ 266
      oblonga........ 268
      problema........ 264
            indica........ 265
      regina........ 263
      sororia........ 265
Polymorphininae........ 263
Polymorphum sagittula........ 103
Polystomella........ 367
      craticulata........ 368
      crispa........ 368
      subnodosa........ 367
      vortex........ 227
polystropha, Bulimina........ 139
      Verneuilina........ 139
Polytrema........ 363
      cylindrica........ 365
      miniaceum........ 363
      rubra........ 664
      utricularis........ 360
pompilioides, Nautilus........ 366
      Nonionina........ 366
porrecta, Textularia........ 109
            agglutinans........ 109
praecincta, Rotalia........ 318
      Truncatulina........ 318

Page.
presli, aculeata, Bulimina........ 161
      buchiana, Bulimina........ 160
      elegantissima, Bulimina........ 167
      marginata, Bulimina........ 159
primaeva, Clavulina........ 158
problema, indica, Polymorphina........ 265
      Polymorphina........ 264
            (Guttulina)........ 264
procera, Miliolina........ 421
      Pulvinulina........ 342
      Quinqueloculina........ 421
propinqua, Verneuilina........ 140, 142
proteiformis, Carpenteria........ 361
            balaniformis........ 361
Proteonina........ 49
      difflugiformis........ 49
      fusiformis........ 49
      pseudospirale........ 94
      testicea........ 50
proteus, Trochammina........ 79, 95
      Trochamminoides........ 79, 95
protumida, Nodosaria........ 262
      Vaginulina........ 262
Psammosphaera........ 46
      fusca........ 46
      parva........ 47
pseudobacillaris, Reophax........ 71
pseudocarinata, Textularia........ 121
pseudofiliformis, Gaudryina........ 151
pseudospirale, Ammobaculties........ 94
      Haplophragmium........ 94
      Proteonina........ 94
Pullenia........ 299
      obliquiloculata........ 299
      quinqueloba........ 299
      sphaeroides........ 299
Pulvinulina........ 326
      auricula........ 329
      berthelotiana, subornata........ 333
      canariensis........ 338
      concamerata........ 328
      concentrica........ 327
      crassa........ 338
      elegans........ 342
      exigua........ 340
      hauerii........ 331, 332
      indica........ 332
      lateralis........ 336
      menardii........ 333
            fimbriata........ 335
            tumida........ 337
      micheliniana........ 339
      oblonga........ 330
      scabra........ 330
      partschiana........ 344
      pauperata........ 340
      philippinensis........ 331
      procera........ 342
      punctulata........ 328
      repanda........ 326
            concamerata........ 328
            punctulata........ 328
      scabra........ 330
      schreibersii........ 341
      truncatulinoides........ 339
      tumida........ 337
      umbonata........ 339

Page.
punctata, Bolivina 136
Pulvinulina 328
repanda 328
Rotalia 328
pupoides, Bulimina 161
chilostoma, Gaudryina 150
chilostomella 150
Gaudryina 149
marginata, Bulimina 159
spinulosa, Bulimina 161
pusilla, Bolivina 138
Cyclammina 87
pygmaea, Bolivina 136
Uvigerina 269
Verneuilina 141
pyrula, Bulimina 162
longi-costata, Nodosaria 188
Nodosaria 187
perversa, Bulimina 163
semirugosa, Nodosaria 187
spinescens, Bulmina 164
quadrangularis, Gaudryina 147
quadrilatera, Bolivina 125
Textularia 125
quinqueloba, Nonionina 299
Pullenia 299
Quinqueloculina 415
agglutinans 441, 464
albatrossi 435
alveoliniformis 443
apicula 422
bicarinata 428
bicornis, elegans 425
boueana 425
bradyana 432
contorta 432
crassa, subcuneata 423
crassatina 443
curta 426
disparilis 424
curta 426
ferussacii 429
fusca 442
kerimbatica 437
philippinensis 438
reticulo-striata 437
lamarckiana 418
limbata 422
ornatissima 452
parkeri 440
polygona 431
procera 421
recta 423
reticulata 434
rugosa 429
sclerotica 441
sculpturata 433
seminulum 416
suborbicularis 461
venusta 420
vulgaris 417
quoyi, alcarina 356
radiata, Amphistegina 372
lessonii 372
Rhabdammina abyssorum 37
radiatus, Nautilus 372
radicula, annulata, Nodosaria 189

Page.
radicula, Nautilus 190
Nodosaria 190
ramosa, Dendrophrya 56
robusta, Dendrophrya 57
Hyperammina 54
Saccorhiza 54
Ramulina 282
globulifera 282
herdmani 363
Ramulininae 282
raphanus, costulata, Siphogenerina 281
Marginulina 256
Nautilus 210
Nodosaria 210
Orthocera 210
Siphogenerina 280
Uvigerina (Sagrina) 280
raphidodendron, Carpenteria 363
recta, Quinqueloculina 423
refulgens, Cibicides 312
Truncatulina 312
regina, Polymorphina 263
reniformis, Cristellaria 221
reophaciformis, Ammobaculites 92
Reophacinae 65
Reophax 65
adunca 70
aduncus 70
agglutinatus 73
bacillaris 67
bilocularis 74
cylindrica 70
cylindricus 70
dentaliniformis 68
difflugiformis 49
testacea 50
distans 66
findens 71
fusiformis 49
guttifer 69
guttifera 69
hormosinoides 69
horrida 73
horridus 73
nodulosus 68
pilulifer 66
pilulifera 66
pseudobacillaris 71
scorpiurus 65
spiculotestus 72
repanda, concamerata, Pulvinulina 328
punctulata, Pulvinulina 328
Pulvinulina 326
Rotalia 326
repandus, Nautilus 326
reticulata, Massilina secans 444
Miliolina 434
Quinqueloculina 434
Rotalina 322
Siphonina 322
Triloculina 434
Truncatulina 322
reticulosa, Vertebralina striata 414
reticulo-striata, Quinqueloculina kerimbatica 437
Rhabdammina 36
abyssorum 36
radiata 37

Page.
Rhabdammina discreta 39
  irregularis 38
  linearis 40
Rhabdogonium tricarinatum 219
Rhabdopleura 39
  abyssorum 39
rhaphidodendron, Carpenteria 363
Rhizammina 45
  algaeformis 46
  indivisa 45
ringens, Ammochilostoma 82
  Biloculina 471, 472
  denticulata, Biloculina 476
  Haplophragmium 81
  Haplophragmoides 81
  striolata, Biloculina 477
  Trochammina 81
Robulina articulata 222
  calcar 231
  costata 239
  cultrata 220
  echinata 233
    Cristellaria 233
  orbicularis 224
  subnodosa 367
  vortex 227
Robulus cultratus 220
robusta, Bolivina 129
  compacta, Bolivina 137
  Dendrophrya ramosa 56
  Gaudryina 152
  Spiroloculina 404
roemeri, Dentalina 193
  Nodosaria 193
Rosalina ammonoides 323
  bertheloti 305
  bulloides 309
  lateralis 336
  orbicularis 305
  poeyi 308
  rugosa 306
rostrata, Truncatulina 321
Rotalia 345
  beccarii 345
  broeckhiana 346
  calcar 346
  (Gyroidina) orbicularis 346
    soldanii 349
  menardii 333
  orbicularis 346
  papillosa 347
    compressiuscula 347
  praecincta 318
  punctulata 328
  repanda 326
  schroeteriana 347
  soldanii 349
  squammosa 308
  truncatulinoides 339
  (Turbinulina) beccarii 345
    elegans 342
Rotaliidae 301
Rotalina akneriana 316
  canariensis 338
  concamerata 328
  contraria 167
  crassa 338

Page.
Rotalina fusca 143
  haidingerii 315
  micheliniana 339
  oblonga 330
  reticulata 332
  schreibersii 341
  umbonata 339
  ungeriana 317
Rotalinae 303
rotulata, Cristellaria 223
  Lenticulites 223
  umbonata, Cristellaria 223
rotunda, Miliolina 460
  Triloculina 460
rotundata, Ammochilostoma 97
  Clavulina 157
  Glandulina 185
  Nodosaria (Glandulina) 185
rubra, Globigerina 289
  Millepora 364
  Polytrema 364
rubrum, Homotrema 364
rufescens, Bathysiphon 43
rufum, Bathysiphon 42
rufus, Bathysiphon 42
rupertiana, Miliolina 464
  Triloculina 464
rugosa, Discorbina 306
  Discorbis 306
  Gaudryina 146
  Plecanium 114
  Quinqueloculina 429
  Rosalina 306
  Textularia 113, 114
Saccammina 48
  sphaerica 48
    catenulata 48
Saccammininae 46
Saccorhiza 54
  ramosa 54
sacculifera, Globigerina 291
Sagenella frondescens 60
Sagenina 60
  divaricans 60
  frondescens 60
sagittula, atrata, Textularia 103
  candeiana, Textularia 109
  fistulosa, Spiroplecta 107
    Textularia 104
  Polymorphum 103
  Textularia 103
    var 113
sagra, Articulina 448
Sagrina bifrons 277
  Siphogenerina 277
  columellaris 276
  dimorpha 279
    Uvigerina 279
  raphanus, Uvigerina 280
  striata 280
    Siphogenerina 280
Saracenaria italica 252
  Cristellaria 252
sarsii, Biloculina 471
saulcii, Discorbina 307
scabra, Gaudryina 146
  Pulvinulina 330

Page.

- scabra, Pulvinulina oblonga 330
- scalariformis, Lagena hexagona 177
- scalaris, Nautilus (Orthoceras) 199
  - Nodosaria 199
    - separans, Nodosaria 200, 202
- schloenbachi, Cristellaria 249
- schlumbergeri, Sigmoilina 449
- schreibersiana, Virgulina 169
- schreibersii, Pulvinulina 341
- schroeteriana, Rotalia 347
- schwageri, Uvigerina 270
- schwageriana, Bolivina 130
- scitulum, Haplophragmoides 80
- sclerotica, Miliolina 441
  - Quinqueloculina 441
- scorpiurus, Reophax 65
- scrobiculata, Spiroloculina 406
  - Uvigerina 276
- sculpturata, Bolivina 134
  - Quinqueloculina 433
- secans, reticulata, Massilina 444
  - tenuistriata, Massilina 445
- selseyensis, Uvigerina 272
- semialata, Textularia 116
- semicostata, Bolivina 134
- seminulum, Miliolina 416
  - Quinqueloculina 416
  - Serpula 416
- semirugosa, Nodosaria 187
    - pyrula 187
- semistriata, Lagena 179
    - striata 179
- separans, Nodosaria scalaris 200, 202
- Serpula concamerata 328
  - lactea 265
  - (Lagena) marginata 182
    - sulcata 179
  - lobatula 313
  - seminulum 416
- Serpulella vagans 55
- serrata, Biloculina 471
  - Ehrenbergina 172
- Siderolites 357
  - tetraedra 358
- sigmoidea, Planispirina 448
  - Sigmoilina 448
- Sigmoilina 448
  - celata 449
  - schlumbergeri 449
  - sigmoidea 448
- simplex, Nodosaria 186
- Siphogenerina 276
  - bifrons 277
    - striatula 278
  - columellaris 276
  - dimorpha 279
  - raphanus 280
    - costulata 281
  - (Sagrina) bifrons 277
    - striata 280
  - striata 280
- siphonella, Gaudryina 151
- Siphonina 322
  - reticulata 322
- siphonifera, Anomalina polymorpha 325
  - Spiroplecta 115
  - Textularia 115

Page.

- soldanii, Haplostiche 78
  - Lituola 78
  - Rotalia 349
    - (Gyroidina) 349
- solita, inflata, Textularia 111
- soluta, Dentalina 192
  - Nodosaria 192
- sororia, Polymorphina 265
    - (Guttulina) 265
- spengleri, Calcarina 351, 336
    - var 353
  - Nautilus 351
- sphaera, Biloculina 413
  - Planispirina 413
- Sphaerammina 99
  - ovalis 100
- sphaerica, catenulata, Saccammina 48
  - Saccammina 48
- sphaeriloculum, Haplophragmoides 83
- sphaeroides, Pullenia 299
  - Nonionina 299
- Sphaeroidina 297
  - bulloides 297
  - dehiscens 297
- sphaeroidiniformis, Ammosphaeroidina 98
    - Haplophragmium 98
- sphaerulatus, Baculogypsina 359
- spiculotestus, Reophax 72
- Spincterules costatus 239
- spinescens, Bulimina pyrula 164
- spinigera, Vaginulina 259
- spinipes, Cristellaria tricarinella 230
- spinulosa, Bulimina pupoides 164
  - Verneuilina 141
- Spirillina 301
  - limbata 301
    - denticulata 302
    - tuberculo-limbata 302
  - tuberculo-limbata 302
- Spirillininae 301
- Spirolina 89
  - agglutinans 89, 92
- Spirolinites cylindracea 483
- Spiroloculina 394
  - acutimargo 398, 410
  - advena 410
  - affixa 410
  - antillarum 407
    - angulata 408
  - arenaria 411
  - asperula 447
  - canaliculata 395
  - circularis 403
  - convexiuscula 409
  - costifera 405
    - plena 405
  - crenata 445
  - depressa 394
  - elegans 406
  - excavata 396
  - fragilissima 451
  - grata 407
    - angulata 408
  - grateloupi 396
    - incisa 397
  - impressa 395
  - inaequilateralis 410

Page.
Spiroloculina limbata 394
  millettii 400
  nitida 408
  orbis 403
  planissima 401
  robusta 404
  scrobiculata 406
  tenuimargo 398
  tenuis 400
  tenuiseptata 401
  tenuissima 400
  validus 404
Spiroplecta 102
  bulbosa 102
  sagittula, fistulosa 107
  siphonifera 115
  spengleri, Calcarina 351
    Nautilus 351
Spiroplectinae 102
spirostriolata, Nodosaria 212
Sporadotrema 365
  cylindricum 365
squamata, Trochammina 95
squammosa, Rotalia 308
staphyllearia, Fissurina 181
  Lagena 181
stipitata, costulata, Nodosaria 187
striata, Dimorphina 280
  haidingeri, Lagena 178
  Lagena 177, 178
  Oolina 177
  Planispirina 413
  reticulosa, Vertebralina 414
  Sagrina 280
  semistriata, Lagena 179
  Siphogenerina 280
    (Sagrina) 280
  strumosa, Lagena 178
  Uvigerina 271
  Vertebralina 413
striatula, Marginulina 255
  Nodosaria (Glandulina) laevigata 186
  Siphogenerina bifrons 278
stricta, Textularia 107
striolata, Biloculina denticulata 477
  ringens 477
strumosa, Lagena 178
  striata 178
subaffinis, Bulimina 166
subangularis, Bolivina 134
subcanaliculata, Nodosaria 204
subcarinata, Cristellaria orbicularis 225
subcuneata, Quinqueloculina crassa 423
subdecorata, Cristellaria costata 241
subdepressa, Virgulina 170
subglobosa, Cassidulina 171
  Lituola 81
subglobosum, Haplophragmium 81
  Haplophragmoides 81
sublaevis, Cristellaria costata 242
sublineata, Nodosaria 207
  hispida 207
submamilligera, Cristellaria 235
subnodosa, Dentalina 139
  Pleurostomella 139
  Polystomella 367
  Robulina 367

Page.
subobtusa, Discorbis 304
subornata, Pulvinulina berthelotiana 333
suborbicularis, Heterostegina 385
  Miliolina 461
  Quinqueloculina 461
  Triloculina 461
subperversa, Nodosaria 208
subpolygona, Nodosaria 198
subrotundata, Gaudryina 146
subscalaris, Nodosaria 201
  pauci-costata, Nodosaria 201
subsquammosa, Virgulina 168
substriata, Lagena alveolata 182
  auriculata 182
substriatula, Cornuspira involvens 390
  Nodosaria 204
subteres, Bulimina 167
  Buliminella 167
subtertenuata, Nodosaria 213
subumbonata, Cristellaria orbicularis 226
sulcata, Lagena 179
  Serpula (Lagena) 179
  apiculata, Lagena 180
Technitella 50
  legumen 50
tenera, Truncatulina 318
tenuimargo, Ammobaculites 90
  Haplophragmium 90
  Spiroloculina 399
  Truncatulina 313
tenuis, Ammodiscus 62
  Cristellaria 250
  Marginulina 250
  Spiroloculina 400
tenuiseptata, Spiroloculina 401
tenuissima, Spiroloculina 400
tenuistriata, Massilina secans 445
  Uvigerina 269
terquemiana, Miliolina 458
  tricarinata 458
  Triloculina 458
testacea, Proteonina 50
  Reophax difflugiformis 50
tetraedra, Calcarina 358
  Siderolites 358
Textilaria chilostoma 150
Textularia 103
  abbreviata 122
  agglutinans 106, 113
    fistula 107
    nodosaria 125
    porrecta 109
  aperturalis 111
  aspera 112
  candeiana 109
  carinata 121
  catenata 112
  concava 119
  conica 123
  crassisepta 121
  excavata 120
  flintii 113
  foliacea 117
  goësii 113
  gramen 105
  hauerii 105
  immensa 118

Page.

- Textularia jugosa 119
  - porrecta 109
  - pseudocarinata 121
  - quadrilatera 125
  - rugosa 113, 114
  - sagittula 103
    - atrata 103
    - candeiana 109
    - fistulosa 104
  - semialata 116
  - siphonifera 115
  - solita, inflata 111
  - stricta 107
  - transversaria 120
  - tricarinata 145
  - triquetra 142
  - trochus 124
  - (Verneuilina) triquetra 142
  - vertebralis 110
- Textulariidae 102
- Textulariinae 103
- Tholosina 51
  - bulla 51
- Thurammina 52
  - papillata, castanea 52
  - papyracea 52
- tibia, Nodobacularia 415
- Tinoporus baculatus 354
- Tolypammina 55
  - vagans 55
- tortuosa, Triloculina 464
- transversaria, Textularia 120
- Tretomphalus 309
  - bulloides 309
- triangularis, austriaca, Valvulina 144
  - conica, Valvulina 142
  - Gaudryina 148
  - Valvulina 142
- tricarinata, bertheliniana, Miliolina 457
  - convexa, Triloculina 456
  - Miliolina 454, 457, 458
  - plicata, Triloculina 456
  - terquemiana, Miliolina 458
  - Textularia 145
  - Triloculina 454
  - Triplasia 219
  - Tritaxia 145
  - Vaginulina 219
- tricarinatum, Rhabdogonium 219
- tricarinella, Cristellaria 230
  - spinipes, Cristellaria 230
- trigona, Allomorphina 284
- trigonula, Miliolites 452
  - multistriata, Triloculina 453
  - Triloculina 452
- triloba, Candeina nitida 296
  - globigerina 286
    - bulloides 286
- Triloculina 452
  - advena 453
  - bertheliniana 457
  - circularis 462
  - cuneata 461
    - incisa 462
  - insiginis 458
  - linneiana 463
  - oblonga 459

Page.

- Trioculina reticulata 434
  - rotunda 460
  - rupertiana 464
  - suborbicularis 461
  - terquemiana 458
  - tortuosa 464
  - tricarinata 454
    - convexa 456
    - plicata 456
  - trigonula 452
    - multistriata 453
  - valvularis 460
- Triplasia 219
  - tricarinata 219
- triquetra, Flintina 466
  - Miliolina 466
  - Textularia 142
    - (Verneuilina) 142
  - Verneuilina 142
- Tritaxia 153
  - caperata 153
  - indiscreta 145
  - tricarinata 145
- Tritaxilina 153
  - caperata 153
- Trochammina 95
  - globigeriniformis 96
  - irregularis 61
    - clavata 61
  - lituiformis 88
  - proteus 79, 95
  - ringens 81
  - squamata 95
  - trullisata 88
  - turbinata 96
  - turbinatum 96
- Trochammininae 79
- Trochamminoides 79
  - proteus 79
- trochus, Textularia 113, 124
- trullisata, Trochammina 88
- Truncatulina 312
  - akneriana 316
  - culter 320
  - grosserugosa 323
  - haidingerii 315
  - humilis 321
  - lobatula 313
  - margaritifera 319
  - praecincta 318
  - refulgens 312
  - reticulata 322
  - rostrata 321
  - tenera 318
  - tenuimargo 313
  - ungeriana 317
    - ornata 317
  - variabilis 314
  - wuellerstorfi 314
- truncatulinoides, Pulvinulina 339
  - Rotalina 339
- tubercalata, Heterostegina 384
  - depressa 384
- tuberculo-limbata, Spirillina 302
  - limbata 302
- tubulata, Lagena hispida 177
- tubulosa, Biloculina 475

Page.

- tumida, Pulvinulina........................ 337
  - menardii............. 337
- tumido-costata, Cristellaria.................. 245
  - labyrinthica, Cristellaria.... 246
- turbinata, Trochammina.................... 96
- turbinatum, Haplophragmium............. 96
  - Trochammina.................. 96
- (Turbinulina) beccarii, Rotalia.............. 345
  - elegans, Rotalia.............. 342
- umbilicatula, Nonionina...................... 365
- umbilicatulus, Nautilus..................... 365
- umbonata, Cristellaria rotulata.............. 223
  - Pulvinulina..................... 339
  - Rotalina........................ 339
- undosa, Miliolina........................... 432
- ungeriana ornata, Truncatulina............. 317
  - Planorbulina..................... 317
  - Rotalina......................... 317
  - Truncatulina.................... 317
- universa, Orbulina......................... 295
- utricularis, Carpenteria....................... 360
  - Polytrema....................... 360
- Uvigerina.................................. 269
  - aculeata......................... 273
  - ampullacea...................... 274
  - angulosa......................... 271
  - asperula......................... 274
    - ampullacea............. 274
  - brunnensis....................... 272
  - canariensis...................... 275
  - interrupta....................... 275
  - nodosa.......................... 275
  - pigmea.......................... 269
  - pygmaea......................... 269
  - (Sagrina) dimorpha............... 279
    - raphanus............... 280
  - schwageri........................ 270
  - scrobiculata...................... 276
  - selseyensis....................... 272
  - striata........................... 271
  - tenuistriata...................... 269
- Uvigerininae................................ 269
- vagans, Givanella........................... 55
  - Hyperammina...................... 55
  - Serpulella........................ 55
  - Tolypammina..................... 55
- ginulina................................. 257
  - acicula........................... 262
  - bradyi........................... 260
  - brukenthali....................... 260
  - elegans.......................... 258
  - legumen.......................... 257
    - elegans................. 258
  - linearis.......................... 261
  - margaritifera..................... 259
  - patens........................... 263
  - protumida........................ 262
  - spinigera......................... 259
  - ricarinata........................ 219
  - oloculina........................ 404
  - liolina.......................... 460
  - loculina......................... 460

Page.

- Valvulina.................................. 142
  - allomorphinoides................. 306
  - angularis......................... 153
  - austriaca.........................
  - capreolus......................... [illegible]
  - conica........................... 14
  - fusca............................ 143
  - parisiensis....................... 15
  - triangularis...................... 142, 155
    - austriaca............ 144
    - conica.............. 142
- variabilis, Cristellaria........................ 229
  - Truncatulina..................... 314
- venosa, Nummulites......................... 383
  - Operculina....................... 383
- venosus, Nautilus........................... 383
- venusta, Miliolina........................... 420
  - Quinqueloculina................. 420
- Vermiculum globosum...................... 173
  - lacteum......................... 265
  - laeve........................... 173
  - margin[illegible]........................ 182
  - oblongum....................... 459
- Verneuilina................................ 139
  - affixa........................... 142
  - bradyi.......................... 141
  - communis....................... 154
  - polystropha..................... 13[illegible]
  - propinqua....................... [illegible]
  - pygmaea......................... 141
  - spinulosa....................... 141
  - triquetra........................ 142
    - Textularia............ 142
- Verneuilinae............................... 139
- Vertebralina............................... 414
  - striata.......................... 414
    - reticulosa............ 414
- vertebralis, Nautilus (Orthoceras)............ 211
  - Nodosaria....................... 211
  - plicata, Marginopora............ 487
  - Textularia....................... 110
- vespertilio, Biloculina....................... 472
- vilardeboana, Discorbis...................... 304
- Virgulina.................................. 168
  - cornuta.......................... 168
  - pauciloculata.................... 168
  - schreibersiana................... 168
  - subdepressa..................... 168
  - subsquamosa.................... 168
- vortex, Cristellaria.......................... 227
  - Nautilus......................... 227
  - Polystomella..................... 227
  - Robulina........................ 227
- vulgaris, larvata, Planorbulina............... 310
  - Miliolina........................ 417
  - Quinqueloculina................. 417
- Vulvulina alata............................. 129
- Webbina clavata............................ 61
- Webbinella clavata.......................... 61
- wuellerstorfi, Anomalina...................... 314
  - Truncatulina.................... 314

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